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U.T. FARMER



OLIVER PERRY TEMPLE HALL

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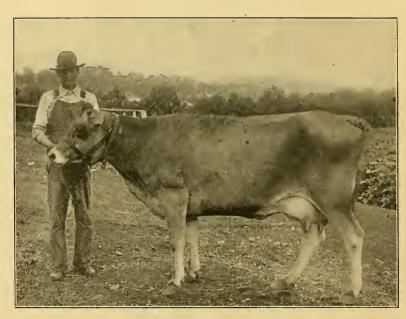
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TENNESSEE

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MAGGIE DOON, 2nd, 221124.
Owned by Tennessee Experimental Station

THE U. T. FARMER

Vol. 7. OCTOBER, 1912.

No. 1.

A NEW DAIRY RECORD FOR TENNESSEE EXPERIMENT STATION. By D. T. HARDIN.

The average production of the dairy cows of the United States is approximately 155 pounds of butter and 2,643 pounds of milk per year. The average production in milk of the dairy cows of the recognized dairy states of the North is 4,581 pounds per year, or 938 pounds more than the average of the United States. The average yearly production of the cows for the whole South is 2,863 pounds of milk, or 1,718 pounds less than the average of the dairy states of the North and 880 pounds less than the average for the United States. The average production of cows in Tennessee is 3,939 pounds of milk per year or 1,076 pounds more than the average of the South, 296 pounds more than the average of the United States, but 642 pounds less than the average of the North. It is estimated that the average cow of the United States kept for dairy purposes about pays for her keep. If this be true, the average cow of the South is kept at a loss of \$19.80 per year to her owner. Milk selling at \$2.25 per hundred weight, the average cow of Tennessee pays over and above the expense of keeping \$6.66 per year, while the average cow of the dairy states of the North pays \$21.11 over and above the expense of keeping. These statements do not look promising for dairying in the South, but when the industry is given the proper amount of attention

there is no line of farming that will prove equally as successful or profitable.

There is a reason for the above difference in profits. The farmers of the North have taken advantage of profitable work, and have practiced a system of selecting and feeding that the average Southern farmer has yet to learn, while the Southern farmers have been contented with a system of unprofitable general farming because it requires less attention and labor.

It is time that our farmers in the South were waking up to the fact that we have far better opportunities for the development of the dairy industry than our brother farmers of the North, owing to the fact that our climatic conditions will permit our growing two crops per year, and pasturing about twice as long a time as in the Northern States, which makes the cost of keeping a herd much less in the South than in the North.

The fact that dairy farming can be made a successful business in the South has been proved by a few farmers in Tennessee, and especially is this true at the Tennessee Experiment Station.

Only recently Maggie Doon, 2nd, No. 221124, a Jersey heifer, bred and owned by the Tennessee Experiment Station, completed her first year's record. She gave 6271.1 pounds of milk containing 354.6 pounds esti-

mated butter fat. Average test was 5.63 per cent fat. Figuring 85 per cent fat for each pound of butter, the fat is equal to 417.6 pounds of butter. This milk was sold at 45 cents per pound butter fat, an income of \$159.57. The heifer consumed during the year 21,663 pounds of roughage, and 3,069 pounds of concentrates making the cost of keep \$63.97. \$159.57 less \$63.97 leaves a profit of \$95.60 for the year, not taking into consideration that the calf from such a cow can be sold for \$75 to \$100.

This heifer was not forced in the least to make this record, but received the same feed and attention as the other cows in the herd, namely, a ration composed of various mixtures of corn and cob meal, cotton seed meal, ground oats and barley, wheat bran and germ meal, with corn silage and alfalfa hay as roughages. The aver-

age daily ration consumed was 60 pounds of roughage and 8.6 pounds of grain.

An important factor brought out in connection with this record, which is the best record for a heifer at the Station is the fact that this heifer inherited the power of milk production from her parents. Maggie Doon, the dam of Maggie Doon 2nd has a yearly record of 443 pounds of butter and 6679 pounds of milk.

Not only in this case is milk production an inherited characteristic, but in nine cases out of ten, large producing cows have directly descended from good producers; so, the farmers of the South should get busy with their herds, selling the unprofitable animals for beef, and selecting heifers from the best producing dams, then they will reap the profits of the dairy industry.

RENTAL SYSTEMS. By JESSE SHAVER, '15.

In all countries more or less farming is done under tenancy systems. England formerly had a system where a few strong men forced the masses to cultivate their fields for them. A similar system made its way into America with the advent of the Dutch and for a time flourished in New York. But as soon as the negro was introduced, these systems gave place to slavery. Vast estates were built up, in the South especially, because its climate was better suited to the negro's constitution, and because he could be employed very profitably in cultivating the cotton, rice and cane of these states. The freeing of the negro brought about by the Civil War left these Southern landowners without sufficient help to cultivate their large plantations. The result was the beginning of the negro tenant system.

The methods of rental at that time were essentially the same as those employed by the cotton planter of Mississippi and Louisiana today. The negro, who is generally penniless, is furnished food, clothing, tools and seed. In fact, all that the negro furnishes is labor, and in return he gets a certain share of the crop; out of this share he must pay in cotton the principal and interest on what was furnished him in the spring and early summer.

Another system is now becoming more popular in some sections. There the negro pays a stipulated sum in cotton for the land; the landlord be ed by referring to some country simiing protected by the crop-lein system. lar to our own, that has succeed fairly well in dealing with this pro-

Even in 1900 thirty-five per cent of all the farms in the United States exclusive of Alaska, were occupied by tenant farmers. There are many causes for this alarming increase in renters; but of these, I shall mention only a few. First comes those young men, who being unable to purchase a farm, accept it as a step towards ownership. Second, there are many people, such as factory workers, who return to the country every year. To these the rental system is a blessing. Then there is a certain class, calling themselves farmers, who live on a farm only one year and move somewhere else the following year. These men are the robbers of the soil.

Each of these renters must pay either a cash rental or give a share of the crop. The share system is most important, largely, because the landlord has a say about what crops shall be planted and how fertilized. This is in striking contrast to the cash rental system, in which the tenant feels that he can grow what he likes.

The cash system is generally regarded to be a step in advance. It is carried out to best advantage when a lease is made for three or more years and when the tenant is required to perform certain specific duties for keeping up the soil fertility. The system of renting for one year has ruined a great many of our Southern farms. Some landlords charge a less rental on grass land in order to encourage the growing of grasses.

The problem of keeping up the soil fertility while renting, is a very troublesome one and can best be solv-

lar to our own, that has succeeded fairly well in dealing with this prob-England, after twenty years of effort, has worked wonders. The English nobleman first tried the long lease system-terms of fourteen and twenty-one years being the rule-but this gave way to a short lease system in which the tenant was compensated for soil improvements just as much as they were worth to the incoming tenant. All disagreements were settled by arbitration. Parliament, no. ticing the value of the new system, made it a law-The Agriculture Holding Act-and classified the improvements for which compensation could be claimed. The classification as given below was taken from Bailey's "Agriculture Encyclopedia;" but parts that were of slight interest to the ordinary American farmer have been omitted.

The first class consists of those improvements which must be made with the consent of the landlord to claim compensation. A few of these were:

- 1. Erection or enlarging of buildings.
 - 2. Building of silos.
 - 3. Making permanent pastures.
 - 4. Making roads and bridges.
- 5. Making wells, or any kind of works for the application of water power or furnishing water for domestic purposes.
- 6. Planting orchards or small fruits.
 - 7. Making or removing fences.
 - 8. Protecting fruit trees.
 - 9. Reclaiming waste land.
- 10. Making embankments against floods.

(All the above are subject to provisions given under class three.).

The second class consists of drainage systems. The tenant must give the landlord at least two months' notice of the work and, if at the expiration of a reasonable time, nothing is done, the tenant may do the work and receive pay for it; but the landlord has the right to increase the rents to such a sum as will equal the amount paid for the drainage, together with 3 per cent interest in twenty-five years.

The third class consists of improvements which may be made without the landlord's consent and compensation may be claimed for same. The following are among them:

1. Liming the soil.

- 2. Application of fertilizers or ma
- 3. The planting of anything permanent which will be productive for more than two years.

The incoming tenant generally pays the landlord the price paid the outgoing tenant for the improvements. In case of soil deterioration, the tenant is liable for the damage. The contracts may be closed or changed by either party by giving twelve months notice of such intention.

This system, slightly modified, should, at least, be given a fair trial and if it should succeed as it has in England, it will well repay all it cost.

FALL FIELD SEED CORN SELECTION.

By THOS. L. ROBINSON, '15.

In all farm crops it is of great importance that the farmer should have good seed. With corn this can be most satisfactorily secured by selection from the field. Good seed is important, first, because it insures a perfect stand from the beginning, saves the cost of replanting, all the corn matures at the same time and the loss from self pollination is thus avoided; second, because, if the seed be of strong germinating power, the young corn plants will not pine away to die but start off vigorously. The young seedling must depend upon the food contained in the kernel until it has developed sufficient root system to gather its nutriment from the soil.

Seed corn should be selected, preferably, from the field after it is well matured and before any heavy frosts have occurred. By selecting your own seed you are getting a strain adapted to your own soil and climatic

conditions and one true to type. Field selection is necessary in order to be at all certain as to the character of corn a kernel is going to grow. Crib selection gives you no chance to know from what manner of plant that kernel came. An ear of corn may be a good one because it has had special advantages such as space, moisture, or fertility. On the other hand it may have grown in a hill with two or three stalks and made a good ear in spite of these conditions. Preference should be given the plants that have produced most heavily in competition with a full stand of less productive plants.

Before you succeed in corn selection you must have an ideal and base your selection on this ideal. Opinions may vary as to an ideal ear, but every one will agree that what we want for seed is the ear which, when placed in the field under average conditions, will produce the greatest amount of good marketable corn. In selecting this ideal we must take into consideration the whole plant—the stalks, the blades, the shank of the ear, the ear itself, the position of the ear on the stalk, and the angle at which the ear hangs from the stalk. Such points may be considered if the seed is selected in the field but we know nothing whatever of the stalk if the ears are taken from the crib in the spring.

Suppose before you go into the field to make the selection, that you fix in your mind the qualities which you wish to find in the plants from which you make your selection. You want a plant that shows adaptability. That is, a plant that shows by its growth that it is well adapted to the average soil conditions and that it does not mature too early or too late. want a plant that shows vigor. That is, a plant that shows by its sturdy, upright growth, its well developed leaves and ears, and its freedom from disease, plenty of strength and vigor. Also, you want a plant of the proper height, with ears that conform as nearly as possible to the ideal in weight, length, circumference and position on the stalk. Avoid all extremes in either direction, both in the height of the plant and the position of the ear. An ear too high from the ground means late maturity. the ears with shanks which allow the ears to maintain a nice angle on the stalk, an angle which throws the husks in a postion to protect the ears from rain. This kind allows easy husking and affords the best of protection for the kernels which we desire.

You want all the plants and ears to resemble each other as much as possible in the manner of growth, i. e., adaptability, vigor, height of plant, and height, angle, and weight of ears; and you want these plants to conform to the variety type. With this ideal in mind, you can start out to select your seed.

One method commonly used is to have a box on the wagon bed into which good seed ears can be thrown while gathering the corn, but the chief objection to this method is that a man is usually thinking more of getting the wagon box filled and the corn in the crib than of selecting good seed corn and so many of the best ears are overlooked. When selecting seed corn give the process your entire attention. The matter is too important to be conducted incidentally while husking.

Another and one of the best methods is to go through the field, row by row, marking those stalks which come nearest your ideal. Reject those plants near a barren stalk because they are in undesirable company and have become contaminated. Select from the most desirable plants enough to give twice as much seed as you expect to use.

Now after making this selection and marking the plants so that they can be easily located, leave them undisturbed until gathering time. Do not strip the fodder or cut them for shocking as you do the remainder of the crop, but leave them to fully mature before they are harvested. After the corn is gathered it should be handled in such a manner as to dry out thoroughly before freezing weather.

In this selection remember that you want ears from plants that are adapted to the average field conditions and not from plants from very rich or very poor spots.

Experiments conducted by the Department of Agriculture have demonstrated that important stalk characters, such as height, height of ear, character of root growth, quantity and width of foliage, number of suckers, number of ears per stalk, etc., are

inherited to a large degree. It is therefore necessary to select seed ears from stalks that are well developed, and this can be done only by selecting from standing stalks at ripening time.

BEAUTIFYING THE FARM.

By PROF. C. A. KEFFER.

Every farm home should have the beauty of grass and trees and flowers. No matter how expensive or how simple a farm house may be it needs a proper setting of grass and trees to make it beautiful; palace and cabin alike are dependent on their environment in this regard.

One naturally expects the most attention to be given the immediate surroundings of the house. The entire farm may well be studied with a view to its beauty. Clean fence rows, neatness in every part of the farm are elements of beauty that are well worth while. But the fields and meadows, the pastures and wood lots of the farm should and must be managed primarily for highest production and appearance is here a secondary consideration.

So the house lot—the farm yard—is especially the place to beautify. The house must be the center of interest, and the treatment of the yard should be such as to give the best possible appearance to the house. Grass is the most important thing in yard decoration, trees next, then flowering shrubs and herbaceous flowering pants are the least important of all.

Have a good lawn. It can be had anywhere if the necessary work is done, and whatever the labor a perfect lawn is a great investment. Grass needs a well drained, deep loamy soil, rich in humus and plant food. Your house lot may require subsoiling and draining; it may need much manure and some lime; if it is weedy it will require a year or two of perfect tillage before the grass seed is sown, but all this, and the necessary leveling and fixing of the soil will be a cheap price to pay for a perfect stand of blue grass. Nothing can surpass pure Kentucky blue grass for lawn purposes.

The lawn made, the question oftree and shrub planting must next be selved. Do not plant shade trees in straight rows, as for an orchard, and use a variety of trees. The greater part of the planting should be near the borders of the yard, so as to have the lawn unbroken. And most of the trees should be to the west and south sides to afford shade in the after-Now this does not mean an entire absence of trees from the lawn, but if there can be big open places, with trees of different shape and size so placed as to bear a group relation, dividing the vard into two or more open lawns, without completely separating them, one has a place for shadows to play on the grass, and this is a fine thing in landscape. There should be an occasional single tree, and it may well be a specimen

of unusual character. A group of small flowering trees, such as the wild crab-apple, or hawthorn, give variety and interest. If the yard is small very few trees should be used.

Flowering shrubs are best used to screen the barn yard or garden from the lawn; thus permitting their planting in masses. An irregular border of shrubbery, composed of a great variety of forms in which foliage and fruit as well as bloom has been studied, will be an object of interest throughout the year. The flowered jasmine often blooms in January, and the witch hazel opens its pale yellow flowers in October or November, and a study of the plant catalogues will give shrubs that fill all the intervening months with blossoms. Add to these such plants as Callicarpus with its purple fruits, and snowberry and wahoo and holly and the evergreen thorne and your border will be bright throughout the winter. My own notion of flowers is that they should be placed where they can be most enjoyed, where they can be seen from the work rooms of the farm house. The passer-by should have an agreeable impression of the place, but we should garden especially for the household. So let flower beds, of simple design, be near the border of the lawn, preferably in front of the shrubbery which will afford a good background for the flowers. Shrubs and flowers should have rather more manure than it takes to get a hundred bushels of corn per acre, and then, as dry, hot summer weather approaches they should be heavily mulched if best results are expected.

Never plant roses in the lawn. They should be where they can be given thorough cultivation. The vegetable garden is the place for them. They are gross feeders and hardy drinkers, and as they are most useful for cut flowers they should be put where conditions suit them best. As with shrubs a study of the plant catalogues will enable one to have a succession of bloom from the violet of winter time to the chrysanthemum and anemone of late autumn. Plant largely. If you can't afford to buy, trade with your neighbors. Nothing so ornaments a perfect lawn as a wealth of blossoms. But it is well to remember that an over-planted yard is as apt to be unpleasing as a too fussy gown.

To my mind no yard is quite successful unless there be a judicious planting of shrubs about the foundations of the house, especially if the house stands high; and unless it have conveniently near the living rooms of the house, a private lawn so planted as to be completely screened from the road, thus making it an out-of-doors sitting room, where, after the morning's work is done, the women of the house may read and sew and where a hammock invites to complete rest.

Books filled with wise thoughts of landscape gardening are available, but any one may make his country home beautiful if he will set about it in the right way, and bring beautiful growing things to live near his house.

THE NATURE AND ADAPTABILITY TO FARM CROPS OF THE CUMBERLAND PLATEAU SOILS

By C. A. MOORES,

Chemist and Agronomist of the Experiment Station.

The typical soil of the Cumberland Plateau is a fine, sandy loam which is easily tilled and at the same time supplied with sufficient clay to enable it to retain well both manurial substances and moisture. Only occasionally is a true, sandy soil to be found, that is, one containing less than 20 per cent of silt and clay matter.

So far as the mechanical condition of these soils is concerned they are well adapted to a great variety of crops, including clover, grass, forage crops, vegetables and fruits. The depth of the soil is variable, but that best suited to cultivation is two or three feet deep. However, good crops may be raised on somewhat shallower soil, especially as the rainfall is generally ample.

The fertilizer requirements of this section have been thoroughly investigated by the Agricultural Experiment Station. Field experiments have been conducted for the past six years. In addition chemical analyses have been made of typical soils. All of the results agree in showing that these soils are naturally very deficient in both lime and phosphate. In fact, the writer has no doubt that had these two highly important elements of plant food been naturally abundant in the Plateau soils, it would have been a rich and highly prized section.

Fortunately both of these materials can now be easily obtained and their profitable use in the raising of general farm crops has been demonstrated many times throughout a large

part of the eastern United States. On the Plateau both acid phosphate and either burnt lime or finely ground limestone rock should be looked upon not only as profitable materials but as necessary to profitable farming. The quantities used need not be excessive, say one thousand pounds per acre of the burnt lime or two thousand pounds of the finely ground limestone once in five years. A fair application of acid phosphate for a crop such as cowpeas is two hundred pounds per acre. The potash supply has been found to be at least fair, so that comparatively little benefit has been derived from applications in our experiments. With the aid of phosphate and lime, the element nitrogen, which is now deficient in most of the cultivated soils of the eastern United States, can be gotten through the growing of leguminous crops, such as cowpeas, soy beans, and especially red clover. Lime and phosphate will enable the latter crop to be very satisfactorily obtained on the new lands of the Plateau, also on the old lands when supplemented by a light dressing of stable manure.

As a money crop and also as an indirect means of improving the soil, Irish potatoes should especially be mentioned. Both the physical makeup of the soils and the altitude of the Plateau favor this crop. Certainly no other section of the State is so well adapted to it. There appears to be no reason why by the growing of clover as a preceding crop and by the liberal use of a complete fertilizer, this section should not become noted for potato production.

LIME AS A SOIL AMENDMENT

By JEHU L. HINSHAW, '13.

Certain materials are sometimes added to the soil for the purpose of increasing the productiveness of the soil in influencing its physical structure. It is true that these materials often supply plant food, but this is of minor importance. Their value comes through their influence on the structure of the soil, which affects the chemical and bacteriological properties.

Lime, though essential to plant growth, need seldom be applied to the soil to feed the plant directly; but it is used on account of its good effect on the soil. This may be either physical or chemical or both.

Effect on Structure and Bacterial Action.

On clay soils, the effect of the lime is to bring the fine particles into aggregates. This forms a soil that is granular and open so the air can penetrate deeper into it and this forms a better and deeper zone for the useful bacteria. On loose, sandy soils, the lime cements some of the particles together, making the structure somewhat firmer, and this in turn increases the water holding power. It should be used in smaller applications on sandy soils.

There is a tendency for soils that are cultivated to become acid from the formation of organic acids in the decomposition of plants, and also due to the fact that a greater amount of mineral bases are removed by the plants than of acids. The acidity of the soil may reach a point where it becomes directly injurious to the growing plant, but it generally becomes injur-

ious, indirectly, by curtailing the action of the bacteria in their process of rendering plant food available. The most favorable condition for the decomposition processes due to bacterial action, is a slightly alkaline reaction and an easily available base to combine with the organic acid. An abundance of lime furnishes this desired condition.

Effect on Plant Food Materials.

Experiments show that there is more or less interchange taking place in the compounds in the soil. The addition of lime may liberate potassium and phosphorus, when otherwise it would be difficult for certain soils to furnish a sufficient supply for a crop. Boussingault found that by adding lime to a clover crop that it greatly increased the amount of calcium, potassium and phosphorus contained in the clover, showing that the addition of lime increases the available supply of the other mineral constituents.

The nitrogen supply may also be greatly increased by applying lime. In this case it is due to the effect on the bacterial action.

In What Form Is It Best Applied?

Lime may be applied as burned lime or as ground limestone. Two tons of ground rock is equal to one ton of quicklime. As a general rule the ground rock gives the most satisfactory results. It is more easily applied than the quicklime. It is slower in its action and will remain in the soil much longer than the burned lime. Quicklime destroys the organic matter in the soil rapidly. Hence one must

be sure to have a good supply of humus in the soil if he uses quicklime.

If a farmer has a muck soil, or any soil that has an excess of organic matter, perhaps it is best to use burned lime. Otherwise it is best to use the ground rock.

How to Apply Lime.

Lime may be applied broadcast from the wagon by hand but this is rather hard and it is difficult to get it spread evenly in this way.

Sometimes a grain drill is recommended but rarely gives satisfaction. There are machines made to scatter either the burned lime or the crushed

rock. If you get good ones, this is the most satisfactory method since it is easier, rapid and uniform. These spreaders are not expensive and might be bought by several farmers in a club.

Lime may be applied at any time when most convenient, preferably after breaking the land for a crop rather than before. The usual application is about a ton or more of burned and twice that amount for crushed rock. This amount will be sufficient for 4 to 6 years on most soils and will be found especially advantageou on clovers and leguminous crops.

OLIVER PERRY TEMPLE HALL.

By D. T. HARDIN.

Thirty-nine years ago Judge Oliver Perry Temple, after much personal effort, succeeded in getting together at the University of Tennessee a number of the representative farmers of East Tennessee, and founded what is known as the "East Tennessee Farmers' Convention." Today this is the largest and perhaps the oldest organization of its kind in America. There are others that deserve much credit for the foundation and success of this great organization, but Judge Temple was the originator of the idea so. when in 1911 the Convention ordered the erection of a Convention Hall, the founder and first president was honored by its name, "Oliver Perry Temple Hall." Judge Temple, besides being one of East Tennessee's most distinguished jurists and writers, was for fifty years possibly the greatest agricultural worker, and one of the best known citizens of the State.

This magnificent building was constructed solely by the farmers of East Tennessee, their main object being a convention hall for the "East Tennessee Farmers Convention."

For the past few years the delegates to the convention have been required to pay a membership fee of one dollar per annum. A fund arising from this source reached \$5,000 in 1911 and it was considered sufficient for a nucleus for the building fund. Then when the building was ordered, Miss Mary Boyce Temple, daughter of Judge Oliver Perry Temple, contributed \$1,000 out of love for her father's memory.

Prominent farmers of the convention also made large donation. The building complete cost about \$12,000.

The building is erected at the Tennessee Experiment Station farm, Knoxville, Tenn., on a series of terraces which makes an ideal location, the center or main portion of the building being on the widest terrace, which has a driveway leading to the main thoroughfare of the farm. The

rear portion of the building being five terraces lower than the front, makes the building at the rear about thirty feet higher than the front. This gives several different floor levels.

On the lowest floor there is a space of thirty-five by seventy feet, wherein are arranged a number of stalls for cattle. On the next terrace above is a driveway through the building so that feed for the cattle can be hauled directly into the building.

On the third terrace is the main driveway entering large doors for driving through the building. On this level is the main arena for exhibiting live stock.

On the highest level or terrace are arranged offices and toilet rooms and a large assembly room.

To one side of the arena is a large stage 14 by 30 feet in size. On the side of the arena opposite the stage are arranged seats in tiers to give a good view of both the arena and stage. This main auditorium space will seat about 800 and when the arena is not being used for showing live stock, chairs can be added to seat about 400 more. On each end of the building is a balcony, these balconies accommodating about 300 people.

The total size of the building is 86 feet by 107 feet and six inches. The main part of the building is of brick

to a height of four or five feet above ground. Above this the building is covered with rough siding. The roof is of composition asbestos shingles, making it fireproof.

Excellent features of the building are the numerous large windows as well as large skylights on the roof which insure ample light as well as ventilation.

Besides being used as a convention hall for the 2,500 to 3,000 East Tennessee farmers, the building will be used as a place for holding pure bred live stock sales, and as a judging pavilion for students during college year. The assembly room will be used for agricultural instruction work both for the University students and for the short course students.

This building is unique in that it is the only one in the United States constructed solely from contributions by farmers, and used for a live stock pavilion and convention hall.

This is written with the hope that the farmers of Middle and West Tennessee will become encouraged over what the East Tennessee farmers have done, and erect a convention hall at some central point, where they can hold annual conventions and complete an organization among the farmers that is very necessary at the present time.

PREPARING FOR WINTER EGGS.

By JOHN GILMORE, '15.

This time of the year is a busy time for the poultry man. Houses are to be fixed for winter chickens brought in from the range and lots of other things to occupy the time of the man who raises poultry.

Winter egg production is the most important item in poultry raising. To

get winter eggs in any number the first thing to consider is the houses. The houses should be ready for the pullets by the first of November. If the houses are to be built, see to that right away. Don't have the houses tight. Leave part of the front out and cover it with wire. Experience

has proven that the open front house is the best. Be sure and don't have any drafts. If you do you will have a lot of hens with a cold or roup. Fresh air is necessary for the production of eggs.

The inside of the house should be sprayed and whitewashed before the pullets are put into it.

After the house is ready put the pullets in it. Great care should be taken in the selection of the winter layers. Do not put all kinds and sizes of pullets in the house. Select large, healthy and vigorous pullets and discard the drones. Use mature fowls in the house because pullets will not lay until the cold weather is over, when the eggs are cheap. You should not put a male bird with your layers. Eggs are better and keep longer if they are infertile. Keep a strong male to head the breeding pen next spring.

The next consideration is to feed and care for the pullets properly. They will not lay if fed any old thing or any one thing. Feed a mixture of the different grains.

A good grain ration to be fed morning and night is as follows:

Wheat 2 parts, corn 2 parts, oats 1 part and buckwheat 1 part, by weight or about 1 part each by measure.

Mash mixture to be fed dry in hoppers open in the afternoon only.

Corn meal 2 parts, wheat middlings 2 parts, wheat bran 1 part and beef scraps 1 part, by weight.

Feed some kind of green food two or three times a week. Keep grit before the fowls all the time.

The care of the pullets should be given special attention. Be regular in your feeding, don't scare your hens, provide some kind of litter for them to exercise in and keep plenty of fresh water before them all the time.

SHALL OUR BOY FARM?

First Points to Decide.

First consult the boy. Farming still conforms to the definition of Xenophon, written about four hundred years before Christ: "Agriculture is an art that renders those who understand it rich, but leaves those who do not understand it, however much they labor in it, to live in poverty." Even the most successful farmers can expect to develop but a few farms in a lifetime. It is not an enterprise for false starts or for the man of changeable mind. The profession of farming is similar to that of medicine and law in that he who would succeed best must early embrace his ambition and hold to it. Agriculture in the next decade will demand men who have had years of training or experience, in most cases training and experience, for training is experience. The agricultural college merely offers the experience of many boiled down to definite terms in a form which may be quickly acquired.

Consult the boy, because his personal preferences and inclinations will have much to do with his success if he becomes a farmer. No business requires more enthusiasm than farming if it is to be successful. The land does not respond to the operator who chooses merely to follow a set of rules. Seience and machinery do not till the

soil; the man is more than ever the determining factor in successful farming. If the man lacks interest no amount of science or machinery will make up for this lack. Consult the boy, because to establish him on a farm requires considerable capital and time. Changes are expensive and he must understand from the first that the enterprise is one of the most complex, subject to scores of influences beyond his control, requiring close application, patience, industry and enthusiasm. Modern farming is more difficult than old-style farming. The possibilities for success are greater, but the handicaps for the man who is not master of the situation are greater than ever before. If the boy understands these facts, and still chooses to farm, then examine his prospects.

What Will the Income Be?

Will your boy be able to begin farming with adequate capital or must be seek a position that returns a salary? If he is to farm, merely upon an average place, the census tells us that he must have land, buildings and equipment valued at over \$6000 and he must have working capital of at least fifteen per cent of this amount, or a total of about \$7000 to begin with. This is the average of all classes of farms and not the average of those that are paying a reasonable net profit. In a prosperous agricultural state in the Central West, like Iowa, the average value per farm exceeds \$17,000, not including working capital. In the North Central states the average per farm is over \$10,000—and this is only an ordinary farm for that section.

Every young farmer of the present day expects to be much above the

average. While many begin on small places and expand their operations as their experience grows, they must at the same time be content with smaller returns and slower advancements than would be possible upon a place of average equipment. The fundamental proposition remains that it requires as much study, as much time and as much capital to make a success in agriculture as in any other business.

The rate of return must also be judged by averages. Recent investigations have shown that farm investments in the central states return about three and a half per cent annually—about the same as good bonds. Many capable farmers are making a net profit of six per cent and more, a few eight or ten per cent, but most of them less than these amounts. Farming is not a business of big incomes.

The Salary Prospect.

The demand for trained men in agriculture has never been greater than at present. The rapid expansion of experiment stations and schools in which agriculture is taught is absorbing many young men from the schools as rapidly as they complete their preparation. The demand for highclass men is even greater than the sup ply, and the present movement for local county experts has created greater competition than ever before. A capable young man, graduating from an agricultural college, who plans to return to the farm must run the gauntlet of a series of offers of salaried positions before he can settle on the home place. Notwithstanding these offers, the majority of graduates from many of our colleges are returning to their home farms and putting into practice the scientific methods they have learned.

From 60 to 80 per cent of agricultural graduates from most schools are engaged in agricultural pursuits and from 35 to 50 per cent are actual farmers. From one of our oldest colleges recent statistics show that the first salaries received by agricultural college graduates in an average of about a hundred cases were over \$1000. The lowest salary to graduates of last year's class was \$500 and the highest \$1600. The great majority begin work in teaching, experimentation or related lines at from \$600 to \$800 a year and are advanced to \$1000 in the second or third year. There are many instances where salaries of \$3,-000 and \$4,000 have been reached in 5 or 6 years, but these were obtained by unusually capable men. There are abundant opportunities for graduates to begin in the Government service at from \$800 to \$1200 a year upon leaving school. That a large proportion of the graduates choose to return to the farm is the best evidence of their confidence in the possibilities of actual farm work. If your boy has funds sufficient only to complete his college course he has waiting, immediately upon graduation, positions with financial returns greater than those offered to men fresh from college in any other line. Medicine, law and engineering do not compare with the prospects in this field.

The Training Required

The advocates of training for modern farming by the apprentice system have almost disappeared. The value of college training has been established beyond doubt. Even those successful farmers who once took their quota of apprentices are themselves

going to college for brief terms, for they recognize it as a short cut to breadth of view, sources of information and actual business ability. The school to choose depends more upon the circumstances of the individual than upon the differences between the schools. All of the agricultural colleges have successful graduates. Courses of instruction vary but little and, except for training for highly technical positions, the various state colleges are about equally efficient.

The boy who expects to become an investigator or a teacher in advanced subjects cannot expect in four years to prepare himself adequately. He can secure but the fundamentals in that time, and by most institutions graduate work of one or two years is demanded of the men who take technical positions. A good general training, including a high school course, followed by a four years' eourse with some specialization in horticulture, animal husbandry, dairying or agronomy-according to the interests of the boy-is usually sufficient to fit him for a beginning in actual farming or in the average salaried position. 意靈

The eost of this training will depend entirely upon the individual, his habits, his social demands and his voluntary expenses. Young men work their way through agricultural colleges and are entering with little or no capital. A larger number earn a part of their expenses. A great many more borrow some of the money to complete Most of them have their courses. their way paid by their parents, and a few have almost unlimited allowances. It is interesting to note that the efficiency of the graduates has varied almost exactly in the inverse ratio of his ready funds. Men have completed courses at some of our best agricultural colleges for less than \$800 and others have spent \$5000. The average agricultural student spends probably \$350 a year, though the essentials may often be had below this cost. The boy who works his way has a serious handicap and it is only the unusual fellow who can overcome it. The full advantages of college life cannot be secured by him who is stinted in his allowance.

Home-Farm Opportunities

With the end of the pioneer period and the disappearance of unlimited opportunities in undeveloped regions, the chances for the farm boy to equip himself for farming and return to his home community are becoming greater each year. The satisfactory country life requires permanency among the people in the community. Sons must follow their fathers and continue plans with respect to property improvement and stock-breeding that have been intelligently inaugurated. The young man who takes up the control of his father's business—particularly in stock-raising—has an asset that is frequently overlooked.

We need more farms upon which generation after generation has continued the development along substantial and far-sighted lines. The dividing of home estates into small parcels is to be discouraged. Farm partnerships are profitable. Brothers may divide the producing side and the distributing side of the farm and work hand in hand to mutual advantage. The breaking up of small estates and the rearrangement into other farms has often been indefensible. In the case of large estates division may be needed, but we must recognize the

fact that combination in agriculture under more efficient management usually results in greater gain, just as it does in commerce or manufacture.

The Countryman's Outlook.

Considerations of health, a satisfactory life and the welfare of his family deserve more attention by the young man who is considering an agricultural career than they have been accorded in the past. There have been times when it required some of the self-sacrificing spirit of the missionary to take up life on a farm or to become an investigator or teacher-who. as a rule, was poorly paid. The farmer now holds his opportunities in his hand. They grow or shrink according to his own ability. The skill of those equipped to be investigators and teachers is coming to be appreciated. Salaries are increasing. Positions are being made more permanent, so that a capable teacher once established is not continually menaced by the prospect of a change. This has been the great need in agriculture, since the migatory habits of agricultural college and experiment station men have been detrimental to the interests of all.

The young man who becomes a farmer today has the prospect of developing one or two farms, but that is about all. He must spend a quarter of a century in preparation, then it requires at least ten years to organize and develop his first farm to its maximum capacity. The days of pioneering are past, and a farm must be looked upon as a permanent business institution in which the profit varies in proportion to the permanency of the plan. The tendency in country life is toward the organization of larger

farms as business enterprises and this organization must be made quickly. The young man who chooses agriculture as a life work should choose to stick.

Shall your boy farm? This is a matter to be decided only after due consideration of his personal preferences, his opportunity for training and his appreciation of the fact that the choice of agriculture is the choice of a life work—a choice from which there should be no change. For those who are adequately prepared and have the requisite enthusiasm the opportunities are incomparable.

-Country Gentleman.

ALUMNI NOTES.

It will be of interest to all to know what the Agriculture Graduates of last year are doing. In the 1911-1912 class there were six Ags or B. S. A. men, all of whom found good positons waiting for them.

Mr. C. E. Allred, '12, instead of accepting a position, took a summer course in the Wisconsin State College and has now entered Cornell University as candidate for M. S. A. degree. Mr. Allred will make a specialty of farm management.

Mr. R. R. Blake, '12, is Professor of Agriculture at the Soddy Agricultural High School.

Mr. J. C. McAmis, '12, County Agriculture Advisor of Madison County. Mr. McAmis has the honor of being the first person ever holding this position in Tennessee, Madison County being the only county in the State with an Agricultural Advisor.

Mr. Judd Brooks, '12, has accepted the position of Supervisor

and partner of the 900-acre Bucklawn Stock Farm, owned by D. L. Conger, Fayetteville, Tenn. Mr. Brooks is doing fine.

Mr. R. H. Felts, '12, is Agricultural Instructor in the Pope High School of Madison County.

Mr. A. S. Adsmond, '12, has accepted the position of Crop Expert with the Wetmore Estate near Duck, Tenn. Mr. Adsmond reports that he is doing well and that the future is very bright.

Mr. W. K. Tipton, '12, is managing his farm near Stony Point, Tenn. He seems to be the only farmer of the class of 1912 and his friends are anxious to hear of his achievements.

Any one wishing to get in touch with any of the Agricultural Alumni may do so through the Alumni Editor. Each Alumnus is asked to send in every little news item of interest and it is hoped that they will contribute articles frequently.

THE U. T. FARMER

Scientific: therefore practical

'Published Monthly by the Agricultural Club of the University of Tennessee.

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EDITORIAL.

"Agriculture is an an art that renders those who understand it rich. but leaves those who do not understand it, however much they labor in it, to live in poverty." These wise words of Xenophon, written four hundred vears before Christ, very truly express the true state of affairs today. But never in the world's history has it been so generally recognized. This is, indeed, an age when education counts, counts on the farm as well as in factory or office. Boys in all parts of the country are fired with a desire to learn, to know something of life, the world and of science. The increased enrollment in colleges and universities eloquently attests this fact. A further point of interest is the remarkable growth in numbers of agricultural students. Once they were few, scarcely recognized exceptions in the colleges, now they are heading the list in many universities and are still the most rapidly increasing element in university enrollment.

The Tennessee farmers are beginning to have advantages in agricultural education of which the farmers of many states cannot boast. Agricultural Special Train, which travelled over every railroad in the State, making over 200 stops and drawing the attention of over 100,000 people, was a feature of some importance and of general interest and instruction to the farmer. This train was on the road from July 1 to August 25, making from 3 to 5 stops daily, the program at each stop being from 2 to 3 hours long and consisting of lectures on dairying, diseases of fruit trees, diseases of animals, bee keeping, soils and crops, health and sanitation, education and various other subjects of interest to farmers.

Another event of great educational importance was a number of Farmer's Excursions to the State Experiment Station. These gave the farmers, at a very reasonable cost, an opportunity to see what is being done at the Station Farm and to hear lectures by some of the foremost agriculturists of the State. Hundreds took advantage of these excursions, but hundreds of others who need the inspiration and instruction, stayed at home. When a good thing is offered it should be received with due appreciation.

Give the girl in the country a chance. This is what Miss Virginia P. Moore is trying to do by starting the Girls' Canning Clubs. Dr. S. A. Knapp, the founder of active Boys' Corn Clubs, said it would be necessary to start girls clubs as soon as the boys' demonstrations had become well advanced. Consequently, in 1910 girls' clubs were organized in South Carolina and Virginia and 325 girls were enrolled that year.

The objects of the Girls' Demonstration Work are: 1. To stimulate interest and wholesome co-operation among members of the family in the home.

- 2. To provide some means by which the girls may earn money at home and at the same time get the education and viewpoint necessary for ideal farm life.
- 3. To encourage rural families to provide purer and better food at a

lower cost and to utilize the surplus and otherwise waste products of the garden and orehard.

Miss Moore has established girls' canning clubs in six counties in Ten nessee and through her tireless efforts among the girls in rural districts, will be added many cans of fresh, wholesome vegetables and fruits and the knowledge of how to can and sell these products thereby giving pocket money to the rural girls as well as to the boys.

These canning clubs might be called the sisters of the boys' corn clubs and both are an inspiration to the young and instructive to the old. The demonstrations given by the girls at the State Fair at Nashville were well attended and instructive to the large crowds that showed their interest. This is the nucleus around which will be built a system and from which will spring instruction and incentive that will work wonders in the State. Leaders in every county as well as every farmer should write to the U.S. Department of Agriculture, Bureau of Plant Industry for Circular No. "A" —79—Girls Demonstrational Work and Canning Clubs.

Live Stock at the Tennessee State Fair.

The live stock show this year was one of the very best in the history of the fair. Not only did it surpass all previous fairs with one exception in the number of live stock shown, but those shown were of exceptional merit.

There were 123 head of Jerseys shown, and men in a position to know, are responsible for the statement that this was the best Jersey show of the season so far. T. S. Cooper & Son,

Nashville, Tenn., showed the Grand Champion Bull, "Golden Jolly's Neble," a great bull which has won all firsts wherever he has been shown. In the aged cow, class competition was strong. There were 16 animals shown in this class. After comparing the animals in the ring for considerable time the judge finally cut the number of contestants down to about 6. It was then necessary for him to have some

of these cows milked out before he could render his decision. When the final award was announced "Young Rosie," owned by Cleberne Farm, Spring Hill, stood at the head of the class, winning Grand Champion.

Dr. W. G. Ewing, Nashville, Tenn., won a large number of first prizes and a good share of seconds. Prominent in his winnings are: 1st Young Herd, 1st Get of Sire; 1st Junior Heifer Calf; 1st Calf Herd, and a number of others. Many excellent Jerseys were shown, not only from Tennessee herds, but also from other States, and the way in which Tennessee breeders won out is additional proof of excellent blood found in Tennessee Jerseys. Only two herds of Holsteins were shown, both coming from Northern herds.

PERSONAL MENTION.

Professor Essary has been assisted during the summer in his work on tomato blight by Mr. K. A. Neely.

Prof. L. G. Willis has been secured to fill the vacancy caused by the resignation of J. E. Toomer from his position as Assistant Chemist of the Experiment Station. Professor Willis is from the Pennsylvania State College.

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IN THE

Minnesota Scoring Contest, 1911

In the champion butter-making state of the Union, the state authorities conducted a Six Months Educational Scoring Contest last year. The state was divided into six districts and in each of these districts the butter-maker receiving the highest average score for the six contests was awarded the prize. In every one of these six districts the prize winner used Diamond Crystal Salt.

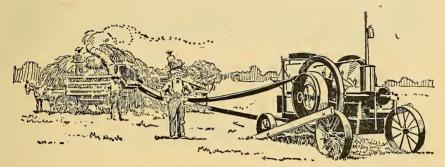
1st District, T. F. Hofdahl, St. Peter		
2d District, J. W. Engel, Pratt		
3d District, B. F. Grundeen, Murdoch Wins on handicap.	.94.45	5-6
E. O. Quenvold, Hutchison	95.12	3-6
4th District, Frank J. Weis, Barrett	93.54	1-6
5th District, John Harms, Ada	92-62	1-2
6th District, A. H. Burkey, Shafer	95.12	1-2

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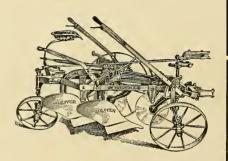


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U.T. FARMER



Dairy Barn, Valley View Farms.

Vol. VII.

NOVEMBER, 1912

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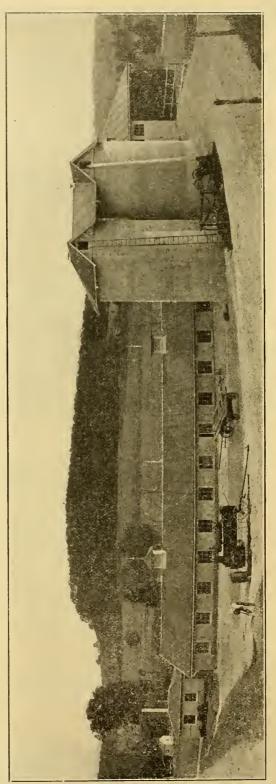
BROWN AYRES

President

KNOXVILLE :-: :-: TENNESSEE

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Dairy Barn, Showing Silos.

THE U. T. FARMER

Vol. 7. November, 1912.

THE NEW DAIRY BARN AT VALLEY VIEW FARMS.

By C. A. HUTTON, '13.

It is a well established fact that the enforcement of sanitary measures and methods is one of the greatest problems involved in the production of wholesome milk. Milk is one of the best of human foods when first drawn from the cow, and, at the same time, one of the most easily contaminated. Volumes have been written on the importance of sanitation on the dairy farm, and instructors, demonstrators, and lecturers from the U.S. Government and experiment stations, as well as officials of city boards of health, are using every means within their power to bring about a more general adoption of sanitary measures in the production of dairy products.

In spite of their efforts the conditions in many of the dairy barns are anything but ideal. Many of our dairymen do not regard the rules and regulations of the boards of health as they should. They seem to think that such rules and regulations only work a hardship upon the producer, without in any way protecting the consumer. On the contrary they are, in most instances, really an advantage to the progressive dairyman. complying with the regulations and producing milk under modern sanitary conditions, the dairyman can advertise his product to better advantage and is able to command a better price for same.

The Dairy Division of the U.S. Department of Agriculture is doing

a great deal toward the improvement of market milk. One line of work carried on by that division is the drawing of plans for modern, sanitary dairy barns and buildings and the supervision of the erection of these buildings. Such a barn has just been erected on Valley View Farms, owned by Mr. Geo. W. Callahan, Knoxville, Tenn.

No. 2.

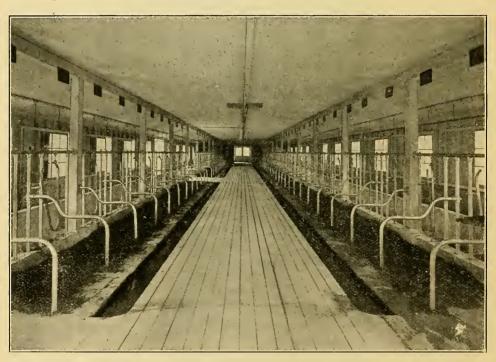
The barn is built after Government specifications and is strictly modern throughout. The location is on a gentle slope, which furnishes good drainage and easy access to the second floor. The general shape of the barn is that of a letter "T," and it is so arranged as to combine the essential features of sanitation, comfort of the cows, and economy of time and labor in caring for them.

The building is a frame structure, erected on a brick foundation. The one-story cow stable is plastered on the outside with concrete, forming what is termed "stucco" construction. After the frame work was erected it was covered with metal lathing, and the concrete placed on this lathing. This makes a very durable building and also a very attract-The interior walls are also ive one. of stucco for a height of about three feet from the floor. This has a decided advantage over wood for the interior walls, since it is much more sanitary.

The eow stalls are in the one story wing extending eastward from the main barn. There are forty-eight stalls for eows, arranged in two rows with the cows facing the walls. This is an important point to keep in mind in constructing dairy barns, as cows get more benefit from the fresh air and sunlight than they would if they faced in, and there is less danger of spreading of disease in the herd. This arrangement is also more convenient

The only partition between the cows is a piece of gas pipe extending from stanchion frame work back to the floor near the gutter. This furnishes sufficient protection to the cows from being trampled upon by their neighbors while lying down, and yet it is a very sanitary arrangement, as there is no place for dust or dirt to accumulate.

Since the mangers are made of concrete, they are so arranged that the cows may be watered in the stalls, so



in milking and economizes time and labor in caring for the cows.

The entire floor, walkways and mangers are made of concrete. The platform where the cows stand is eovered with cork brick. This makes a very satisfactory floor, being sanitary and yet not cold and hard like concrete. Mr. Callahan believes that the dairy cow is entitled to the best of treatment and that it really pays in dollars and cents to give her the most comfortable quarters possible.

Each cow is confined in her stall by means of a porter swing stanchion.

that it is not necessary for them to leave the stable in cold weather.

In addition to the forty-eight eow stalls in the east wing, there are on the ground floor of the main barn, twelve stalls for heifers, three maternity stalls, three stalls for the delivery horses, and thirty-four calf pens, or provision for the housing of 100 head of stock in the entire barn. The most modern and sanitary methods of construction prevail throughout the building. Numerous large, sliding windows on all sides furnish an abundance of light and ventilation.

Hay and concentrated feeds are stored on the second floor of the main barn and are conveyed to the feed room below by means of chutes. From here the feed is distributed to the animals by means of feed carriers which run on overhead tracks.

Two round concrete silos each 16 x 32 feet, and having a combined capacity of about 260 tons, furnish silage for the herd and young cattle. It is planned to feed some silage during the entire year, thus preventing the too common shrinkage in milk flow during the hot, dry season when pastures are short.

Manure is removed from the barn by means of a litter carrier and overhead track, is dumped into a manure spreader and hauled to the field daily when the weather will permit. small concrete pit has been built for storing the manure when the fields are too wet to permit spreading. This pit was purposely made small in order to prevent the accumulation of a large amount of manure here, since it loses a large percentage of its fertilizing value when under such treatment. In addition, it is very unsanitary to have such accumulations around the dairy barn and for these reasons it has been planned to spread the manure daily as far as possible.

Near the east end of the barn is a small milk room, connected to the cow stable by means of a covered walkway. This milk room will contain the milk scales and record blanks, the Babcock tester, separator, boiler, wash vats, etc. A milk house is now being built at the spring, about 100 yards from the barn. The entire house, floor, walls and roof, is to be built of concrete.

Not only are the sanitary conditions within the barn next to ideal,

but the barnyard also claims its share of attention. It is impossible to keep the interior of a barn clean if the yard surrounding it is a mire of mud and manure. Instead of such a mire, the barn at Valley View is surrounded by a well graded yard covered with several inches of finely crushed stone, making it clean and dry at all times.

The dairy herd consists of 48 registered Jerseys with the complementary number of young things, and is headed by two good bulls: Devotion's Noble and Gennise's King Fox. In the very near future a complete system of milk records will be kept, and then each cow will be charged up with the amount of food consumed and will be required to yield a sufficient profit. Mr. Callahan realizes that simply being registered does not necessarily guarantee that a cow is a high producer but that some system of records of production should be kept, so that the poorest producers can be eliminated and the average production of the herd constantly increased.

The visitor at Valley View Farms is impressed with the value and importance of business methods on the The many different ments the farm furnishes inviting fields of study and investigation for the student of agriculture and the practical farmer alike. While many dairymen would not be in position financially to duplicate this model dairy barn, yet a study of the many points of superiority embodied in it would afford valuable suggestions to any one contemplating the erection of a new dairy barn or the remodeling of an old one, and any one in such a position could well afford to travel many miles in order to see and inspect this model building.

FALL SEEDING OF RED CLOVER.

By GEO. B. ROBERTS, '14.

The most serious problem at present confronting the American farmer in many of the clover sections is the increasing difficulty of maintaining stands of clover upon the farm.

By recent experiments it has been shown in many instances that early autumn seeding of red clover without a nurse crop has a decided advantage over spring sown clover with a nurse crop. This is especially true in Tennessee and many parts of the country where the red clover disease is prevalent. The fungus disease will not so readily attack the young plants in the fall, and the crop is usually ready for cutting the following spring or summer before the disease has time to scarcely injure them. Old plants are much better able to stand the attacks of the disease than the younger ones, and it often times occurs that second cuttings are made the succeeding year from early fall sowing.

To insure a good stand of clover when seeded alone, it is necessary to take several things into consideration. First, we will mention the crop rotation. In a great many states where fall seeding is practiced it is customary to follow corn with clover or sow it in the corn at the last cultivation. The greatest objection to this practice, especially in the South, is the great danger of the new crop being stocked with weed seeds that have been allowed to mature with the corn. In case the clover seed is sown at the last cultivation of the corn there would be danger of either a lack of moisture owing to the corn absorbing a greater part, or a growth of erabgrass might smother out the clover. The more successful practices have been where the clover has followed some cultivated crop, such as potatoes or grain of some kind.

The Director of the Tennessee Experiment Station has suggested the following rotation: Corn at the last cultivation should be sown to rye, and the rye turned under or cut off and followed by cow peas or soy beans planted in rows so that cultivation may destroy the weeds. Follow the beans or peas with wheat or other grain and instead of seeding to clover in the spring with a nurse crop wait until August and sow without a nurse crop. One advantage to be gained from this rotation is the necessary time it gives for the preparation of the seed bed, and this is another cssential for insuring a good stand.

Proper attention ought to be given to the preparation of the seed bed especially if the soil is in any way depleted in fertility. A firm, well settled seed bed is desirable. For this reason the clover should not be seeded on freshly plowed land, but time should be allowed to settle the soil unless heavy rains intervene which will pack it. In this case harrowing and disking are necessary to work up a good mulch to prevent rapid evaporation of the soil. It seems that no difficulty ought to be experienced where wheat stubble is turned under in July. The land can be kept harrowed for six or eight weeks before time to sow the seed and this, in most cases, insures a sufficient moisture to germinate the seed. The seed bed will also be compact enough to make a sure growth of the clover roots.

It must be remembered that the clover plant adds only nitrogen to the

soil but removes large quantities of potash, phosphorus, and lime from the soil, especially when cut for hay and the manure resulting thereform is not returned to the land. Hence, in most instances it is best to add fertilizers of some kind. Usually the humus turned under or other crops grown on the land will provide for the potash and phosphate, but a little phosphate will always help. It is a good plan to add lime when any of the clover crops are seeded. The amount of lime to be used will depend upon the acidity of the soil. Anywhere from 800 to 2,000 pounds of burnt lime or 1 to 2 tons of ground limestone will be needed. It is better to use the ground limestone if it is accessible, but price and convenience should decide. The lime is not needed so much for supplying food for the plant as it is in neutralizing the

acidity of the soil, liberating other plant food, or aiding bacterial action.

On account of the large amount of weed seed likly to be in stable manure it is better to apply it to a preceding crop; since usually enough residue is left to feed the young plants.

In conclusion I shall mention one other advantage of fall seeding. Often on run-down farm or depleted soils where a longer time is necessary for the preparation of a seed bed, autumn seeding is advantageous. The farmer's time is always more valuable in the late spring than it is in the early autumn, and the amount of work necessary for the proper preparation varies but little. In either case an increased amount of work is essential but owing to the fact that the red clover is of such great value as a soil improver, together with its importance for hay, this method of obtaining a stand should be urged more strongly.

PRINCIPLES OF WINTERING STOCKERS AND FEEDERS.

By C. E. ALLRED, '12.

Experiments show that cattle make much faster gains in summer than in winter, and at something like fourfifths the cost of winter gains. In addition to the more rapid gain of the cattle, the hogs thrive better in summer, and the labor required for feeding, hauling manure, etc., is materially reduced in summer feeding. Therefore the great majority of feeders prefer simply to "winter over" their steers, fattening them in the summer. By wintering over is meant keeping them only in good growing condition during the winter months. They may even be allowed to fall away some in flesh, but the growth should be such

that they will weigh as much in the spring as at the beginning of winter.

During the winter the difficulty of preparing grain for the cattle is less than in summer for at that season the grain is not so difficult to masticate, as it has become in summer. So it is usually not necessary to soak grain for winter feeding.

By the process of wintering cattle their value is enhanced to a less degree than by the fattening process, but the enhanced value is a necessary deficit in the wintering process. This enhancement is due to the fact that the steer has the summer season ahead of him, and the summer season is the profitable season. This enhancement of value is, therefore, mainly one of position, whereas in the case of the fattening steer it is one of condition.

The gains made on grass are found to be inversely proportional to the amount of fat the animal carries, and are almost inversely proportional to the gains made the previous winter. Therefore, if the cattle are to be grazed the following summer it is important that they be wintered lightly. And it is generally the case that the farmer has a large quantity of coarse fodder and only a limited quantity of grain, with a considerable quantity of cheap grass to be utilized the following summer.

Thus, steers wintered on alfalfa or a ration of one-half alfalfa make much faster gains during the winter than those fed on prairie hay or cane alone, but do not make as fast gains during the following summer.

It is found that steers wintered on a ration of alfalfa or one-half alfalfa make a greater gain during the winter and summer combined than those wintered on prairie hay or cane alone, but probably at a greater proportional cost.

The cost of wintering steers is approximately one dollar per hundred-weight, though this might be greatly reduced in the Southern States by winter pastures and cheap roughages. In Alabama four bunches of steers were bought costing \$2.56 per hundredweight. When the cost of wintering was added to the fall price; the following was the total cost per hundredweight: Lot I, range alone, \$3.01; Lot II, range plus half ration

of cottonseed meal and hulls, \$3.34; Lot III, range plus half ration of cottonseed meal, \$3.20; Lot IV, range plus half ration of cheap hay, \$3.09.

The above applies to "stockers," as I understand the term, to mean steers to be fattened during the following summer. If we have feeders or those to be fattened during the winter it is found best to feed full feed, at least during the last month of the following period.

Experiments have shown that steers on full feed gain more rapidly and somewhat more economically when having access to an open shed, or confined in open lots than when sheltered in a well ventilated barn. In our climate here, it is doubtful whether we need any shelter at all, unless it be simply a windbreak for the most severe weather. The large amount of feed consumed by a fattening steer produces great quantities of heat when it is burned in the body.

An abundant supply of pure water at a convenient place is necessary to fattening steers, for they require large quantities daily. They should not be required to travel too far, as it is a waste of food taken up in every year. They should be fed with utmost regularity and encouraged to keep as quiet as possible when not eating.

So long as the feed offered is sufficiently palatable to make the steer gain at a rapid rate, and in a reasonable time be ready for the market, the feeder is not interested in how much passes through the steer unmasticated or undigested, because the hogs will make good use of it. So do not spend much in grinding grain, and similar processes. It is almost as profitable to use a supplemental feed like tankage or linseed or cottonseed meal for hogs that follow cattle, as for other hogs that are fed on fresh grain.

For Tennessee conditions the ration recommended is, say, 40 pound silage and 10 pound alfalfa or clover

during first half of feeding period. Change gradually to 4 pounds cotton seed meal and 4 pounds corn, decreasing silage 20-30 pounds and alfalfa 8-10 pounds. This ration will produce quite a good gain and at a reasonable price; and the hogs that follow during the latter half of the period will be well cared for.

THE WEST TENNESSEE EXPERIMENT STATION

By C. W. HUME, '14.

It has been said that in most lines of endeavor the more valuable lessons are not learned from books, but from concrete examples worked out where conditions are known and the results are unmistakable. in agriculture are no exception to this rule, for in order to bring specific workable knowledge to the farmer, he must see results worked out in experiments under conditions similar to his own; and this is the work attempted by the West Tennessee Experiment Station.

This station is situated in Madison County, one mile west of Jackson in a county where cotton and corn are the chief crops and where stock raising and dairying are in their infancy. Much of the land of this section, exhausted by continuous cropping and poor cultivation does not enough to pay for the labor expended in growing the crop. much of the land lies idle, subject to the ravages of erosion. The fine texture of the soil and the absence of any organic matter makes the holding of the soil a difficult proposition. Thoughtful farmers have endeavored to restore the lost vegetable matter and to hold in check soil erosion; hence they have watched with interest the efforts of the station to solve these problems for them. Although this work has been necessarily slow, yet the results accomplished since the establishment of the station four years ago have forced the most conservative to admit that there is much hope for the future.

Here the farmer can see the excellent effects of a winter cover crop in holding the plant foods through the winter for the use of crops in summer and their ability to prevent soil wash. He can see the beneficial results of turning these green crops under in the spring to increase the vegetable content of the soil. While over the whole farm the good returns from intensive cultivation are apparent. He is surprised to learn that 31/2 tons of red clover hay and 4½ tons of alfalfa per acre were raised upon land which a few years ago was considered worthless for crop production. Winter oats yielded 50 bushel per acre and barley, 30. While the average this year of the silage crop, notwithstanding the dry season, was 10 tons per acre. When in astonishment he asks how this magic has been wrought, when upon his own farm with exactly the same character of soil, he can produce no such results, he is told that nothing has been done which the average farmer cannot do. For by the use of winter cover crops, plowed under in the spring, and the use of nitrate of soda, the miraculous has been accomplished.

upon legumes, deep plowing, etc., here also he finds many varieties of corn and cotton being tested. The most striking of all the experimental plots are those that show the increased yields from the use of nitrogen, whether it is in the form of nitrate of soda or as organic nitrogen added to the soil from the air by leguminous crops. Herein lies the most encouraging factor in West Tennessee soil improvement in that the best results from fertilizers are



Administration Building, West Tennessee Experiment Station.

He finds that the old idea that West Tennessee cannot become a dairy section has been exploded. He is shown a registered Holstein 3½ years old which has produced 12,000 pounds of milk during the past year, and there are also two other heifers of the same age who will have records of 10,000 pounds for the year.

But perhaps the most interesting and instructive feature of the farm is the experimental plots. Here is apparent the good effects of lime not obtained from phosphorus or potash but from nitrogen and that this nitrogen may be obtained from the air through nitrogen-gathering bacteria.

Although the work of the West Tennessee Experiment Station is just beginning to bear fruits, yet the results obtained are encouraging to say the least, and but hint at the possibilities which are destined to mold Tennessee into a great agricultural state.

TERRACING THE SOIL TO PREVENT WASHING.

By F. S. CHANCE, '14.

The most enduring form of wealth is real estate and the most useful real

estate is the agricultural land. The greatest problem before any farmer to-

day is how to maintain good land, because upon the producing powers of the soil depends any lasting prosperity. All life comes from the farm and as the world becomes more thickly populated the high producing quality of the soil must be looked to for the people must be fed.

In many sections of this and other states we find soils known as wornout soils. This may be due to several causes—the most important of which is the washing away of the soil. The Mississippi River deposits more than 50,000,000 tons of soil at its mouth annually, 11,000,000 tons of which was emptied into the Mississippi by the Tennessee. We know that this soil has been collected all along the river's course. The majority of this soil could be kept in place by the proper soil management and by terracing the hill slopes. It is of vast importance that this soil is kept, for as a rule it is the soil containing most plant food that is washed away. The retention of this soil is aided very materially by terracing.

There are two forms of terracing, viz., the old form and the new form (or Mangum) terrace. The new form terrace is the one practiced now to the greatest extent. It is taking the place of the old form for various reasons, the most important of which is: In the new form the soil is not made so rough that it can not be cultivated with even the most delicate farm tools.

The old form of terracing was merely a process of cutting ditches around the hill with a fall from 6 to 14 inches per 100 feet. These ditches prevent a rapid flow of water directly down the slope and thereby keeps gullies from being formed. In order

to dig these ditches with the proper fall it is necessary to use some form of leveling instrument. The new and old form of terracing is laid off in just the same way but where the difference comes is in the construction.

In the new form, after having established a line along which the terrace is to be made, the work may be done with the ordinary turning plow, the hillside plow, or a road machine. The established line is back-furrowed in such a way that a continuous terrace bank will be formed with the depression on the upper side for conveying the water off. Ifordinary turning plow is used as far as practicable, the terrace must be finished by the use of shovels. reversable disc or hillside plow is as a rule to be preferred to the mold board or land slide plows. Certain forms of the lighter and simpler road machines are superior to any form of plow and they do the work quicker, better and at from fourth to one-half the cost.

The whole terrace including bank and depression above may be from 8 to 16 feet wide, depending upon the character of the soil, the steepness of the land terraced and the amount of water it is to carry. However the new form of terrace is not practicable on very steep slopes, for it then would be impossible to get that broad, flat surface without an enormous amount of work and it would expose the subsoil, which would be a bad plan.

The fall of the terrace will vary with the quantity of water to be carried and the nature of the soil. The more open the soil, the less fall required. Some soils seem to run together as soon as their surface becomes wet. In such cases the terrace should not only have a greater fall but its bank and depression should be higher and deeper respectively. The lower the grade that will carry the water, the better the terrace will serve its purpose.

The cost of terracing is slight and

it is far outweighed by the benefits derived from it. The sooner the farmer realizes the importance of stopping his soils from washing, the sooner the Mississippi will cease to empty annually 50,000,000 tons of our rich Southern soil into the gulf of Mexico.

WATER FOR THE FARM HOME: SOURCE.

By K. A. NEELY, '13.

The failure to employ modern methods of reducing labor inside the house is a great hardship on many farms. Thoughtfully planned, conveniently arranged and carefully constructed dwellings are as essential in the country as in the city.

The time is close at hand when running water in the farm home will not only be considered a luxury, but a necessity. The source of the water supply should be carefully considered. Water from a spring comes first in desirability and that from a deep well second. Water from a shallow well should be avoided as far as possible on account of the water being so close to the surface and likely to become polluted.

The well should be located on the highest ground in a convenient place and never allow surface water to collect near.

In some sections springs or good wells are impossible. Here the only remedy is a cistern and catch water from housetop during rainy seasons. The size of the cistern will depend upon the amount of water needed and length of dry season. It should be constructed of cement or good hard brick laid in cement mortar. In connection with the cistern should

be built a filter chamber which is connected by means of pipes to the gutters. A cut-off should be placed on the pipe leading from the roof to a filter chamber to divert the flow to the outside for a few minutes at the beginning of each rain to exclude the dirt collected on the roof and in gutters.

There are several ways in which the water may be stored so that it can be piped to the house. First, the gravity system or elevated tank. The tank may be located either in the attic or on an outside tower. The tank may be either wood or galvanized iron and vary in size from 300 to 2000 gallons in capacity. If a large size is used, it should be supported on a tower outside. The cost for a galvanized iron tank will vary from about \$8.00, for 100-gallon size, to \$16.00 for 500-gallon size.

The second method for storing water is by means of a pneumatic tank which consists of an airtight tank, with the water pumped into the bottom forcing the air to the top of the tank and compressing it. The expansion of the air forces the water through the supply pipes to the place desired. The pressure is increased by pumping more water into the

tank. A pressure of 15 pounds will raise water to a height of 33 feet. The price of a pneumatic tank varies with different manufacturers. One 30 in in diameter and 10 feet high, which will supply a family of five, will cost from about \$100.00 to \$140.00. Neighbors can sometimes combine and put in one large plant which will greatly reduce the cost.

What will be the most convenient and economical means of forcing the water into the storage tank depends upon the situation in each case. The source of supply, the amount required, the need of the power for other purposes, the available fuel, and the cost of labor will have a great bearing on the matter. The hydraulic ram and the windmill have the advantage of operating without fuel, but the ram requires at least an 18-inch fall. The gasoline engine requires fuel and attention, but the supply can be more easily regulated.

The hydraulic ram may be used if

the source is a spring, stream or a flowing well. It can be used with a fall of 18 inches, but with greater fall it can force water higher and for a longer distance. The head may be made higer by damming up the stream. A small ram will cost about \$50.00.

Small gas engines are now manufactured for the purpose of pumping water. They have the advantage over the hydraulic ram in that the water may be pumped when wanted and the size of the tank more accurately determined. It does not require an expert to run them and they may be used for driving light machinery when not needed for pumping water. A small engine, 2-3 horsepower, will cost from \$60.90 to \$125.00.

A good force pump will answer the same purpose and is considerably cheaper, but has the disadvantage of requiring hand labor and a great deal of time.

A STUDENT'S OPINION OF THE VEGETABLE EXHIBIT AT THE STATE FAIR.

By JESSE SHAVER, '15.

A large collection of good Irish potatoes at the State Fair attractthan usual attention. ed more Twenty-two different varieties were shown: the old-fashioned Peachblow and Dakota Red being among the number. The Dakota Red, you remember, is a potato ill suited for culinary purpose on account of its strong flavor and deep eyes. Irish Cobbler showed itself to be one of our most popular varieties; there being eighteen entries in that class. The entries in the classes, although being less in number than the Irish Cobbler, were pretty full. A passerby remarked that the North could boast of nothing better than these.

The county exhibits of potatoes were very good, a great many different varieties, some new varieties among them, being shown. Mr. P. W. Walker of Buntyn, Tenn., succeeded in capturing the first prize of \$50.00 (Fifty Dollars). The second prize of \$25.00 (Twenty-five Dollars) went to Mr. C. S. Looney, of Winchester, Tenn., who, by the way also had a very fine exhibit of corn

and forage in those departments. A local gardner, Miss Tea Reeves, won third prize of \$15.00 (Fifteen Dollars) and also had the pleasure of winning first in the home garden class. Her exhibit consisted of many varieties of vegetables, some of them being particularly attractive on account of their color and characteristic shape. Her nearest competitor, Mrs. J. M. Looney of Winchester, was handicapped by having to show shipped goods which had been roughly handled.

The surprising feature about the potato show was that the greatest number of the prizes were won by a woman—Mrs. Tea Reeves. She won in all eleven first and seven seconds or a total of forty-seven dollars (\$47) on the potato table. Mr. Walker, of Buntyn, came second with a total of six firsts and seven seconds or a total of thirty-two dollars won on the potato table.

In other vegetable classes, as in the potatoes, a few individuals won the majority of the prizes. Will Thoni, Arnold Zopfi, and John P. Rotler, three local gardeners, exhibited some fine vegetables, which, of course, presented a better appearance than those that were shipped. A peck of very fine red globe onions was exhibited by Will Thoni. These chious were large, uniform and well colored. Through the courtesy of Arnold Zopfi, the table was decorated with two large coxcombs and a Mexican pepper plant. The classes for cantaloupes, sweet corn squash were not over crowded; and. in some instances, inferior goods, through lack of competition, took the prizes. The squash in particular, were very poor specimens. The peppers on the other hand, fine and large. The watermelon exhibit certainly was a good one, most of the melons weighing over fifty pounds. The first prize melon in the single entry class, grown by Mr. J. W. Hurt, of Hermitage, Tenn., was of the North Carolina Honeycomb variety, well formed and weighing seventy-eight pounds. The other entries were almost equally as good.

THE CORN EXHIBITS AT THE STATE FAIR.

By JEHU L. HINSHAW, '13.

The corn exhibits of the State Fair were larger this year than last. However, on the whole, the quality was not as good. Much interest was shown in the Boys Corn Club exhibits, there being a goodly number of exhibits from Middle and several from East Tennessee. West Tennessee was not represented. There were two Boys Corn Club County exhibits and four regular county exhibits.

The Boys Corn Club County exhib-

its were from Trousdale and Franklin Counties. Trousdale County, the smallest county in area and population, won the first prize. The Trousdale County exhibit was under the supervision of Mrs. K. L. Nickols, the superintendent of schools for that county. The exhibit was of fair quality and showed that there had been some selection in arranging the corn. There were twenty ten-ear lots representing five varieties. The Franklin County exhibit, under the charge of Mr. A. W. Smith, was not as large as Trousdale's and had only three varieties.

There is no reason why the Boys Corn Clubs of other counties should not have county exhibits at the State Fair. The prizes are such as would stimulate a friendly rivalry among the Corn Clubs. If the superintendents of the schools of the different counties would see that their counties have live Boys Corn Clubs and that they have exhibits at the Fair next year, it would mean much for the boys and for the state.

In order that there might be awakened the spirit to excel among the individual members of the Boys Corn Clubs and that each boy would be encouraged in the growing and selection of corn, the Tennessee Metal Culvert Company offers a prize of twenty-five (\$25) dollars for the best ten ears grown by members of Corn Clubs from each of the three divisions of the state. There were only two entries from East Tennessee and they were very poor. The prize was given to Roy McMahan of Sevier Coun-There were twelve entries from Middle Tennessee, some of which were very good and showed that the boys have realized the need of selection. J. B. Rizer of Franklin, Tenn., won the prize for Middle Tennessee. For some reason or other West Tennessee was not represented.

The following prizes were offered for county exhibits: first prize seventy-five (\$75) dollars, second fifty (\$50) dollars and third twenty-five (\$25) dollars. Only three counties competed; Bedford, Dickson, and Franklin. Bedford won first prize, having a large number of varieties

and the samples from the varieties had been carefully selected. Dickson came second not having as many varieties as Bedford and Franklin last, although it had the largest number of varieties, but the quality was poor. In fact there was no quality at all, there was no uniformity and the samples were unsound.

Much could be said about the individual entries of the different varieties, but the most important thing to be discussed is the selection of next years show corn. Begin this fall, select your seed from the field this season and do it with the view of taking a prize winning lot to the fair next year. But in order to do this one must know the points that are considered in judging corn.

Be sure that the ears are all from the same variety and that they conform to the type of that variety. The ears should be of uniform length, size, shape and color. fact they should be as near alike as possible in every way, see that the rows are straight and that they are not too wide apart. The butts and tips must be well covered, do not pick the ear with short rows and extra kernels crowded around butt, but pick those with the straight rows that extend well over both ends of the cob. Be sure that the ears are all sound and in good market In short, the ten ears condition. for the exhibit should be of the same length and circumference, carrying their size to the tip, the rows straight, covering the tip, and butt with no rotten grains.

HINTS ON PACKING APPLES.

By F. W. FLEMMING, '14.

Some weeks ago the writer had occasion to observe somewhat closely the splendid apple exhibit at the Tennessee State Fair. The exhibit was especially good, considering the time of year and it was interesting to see how many people wondered and doubted that such apples could be grown in this state. They were, however, and this fact shows that Tennessee is awakening to its horticultural possibilities, especially in the growing of apples. The people have begun to realize that Tennessee not only is a state adapted to grain and forage, but offers great opportunities to fruit growers as well.

To be successful in the fruit business it is as essential to understand proper marketing and packing as it is to know how to raise the fruit. In the apple business proper packing is as important as any feature and the art can be learned best only by experience.

The success of any grower is largely dependent upon the manner in which he markets his fruit. So many growers often forfeit their almost established trade by allowing to pass into market a few boxes or barrels of apples bruised and scarred because of their neglect and carelessness in packing. Of the few methods in present use, it seems that the barrel is gradually being abandoned for the box.

To pack in boxes successfully, however, requires a great deal of experience. Some pack the apples on their sides in straight rows, others pack them on their ends, butt downward. Both of these methods are

good but must be governed by the variety of apples. In preparing for packing one should grade his apples into at least four grades. In doing this the inexperienced packer should use a canvass with four holes of the desired size, into which he may insert the apples in order to obtain uniform size for each grade.

The first grade should be the finest fruit, well colored, of high quality free from blemish, of fine finish and of uniform size. These apples should be put up into boxes, which will be mentioned more in detail.

The second grade which may be put in barrels, should also be free from blemishes and bruises, and should be of uniform size throughout the barrel. The third grade of course is of a smaller size, less free from blemishes and bruises and must be marketed as such. The fourth grade which is the culls should not be sent to market, but should be made into eider or used in other ways.

As was mentioned before, different styles of packing are used, but no matter what the style may be, it should be so arranged according to the size of the box that the fruit should project slightly above the top of the box at the ends and about an inch in the middle. This gives a slight bulge in both top and bottom after the box is nailed. An exhibit after this style makes a splendid show and is one to be recommended.

The different standard boxes in present use vary in different sections of the country, taking one for example, a box, $10\frac{1}{2}$ x11 $\frac{1}{2}$ x18 inches is used in some sections. A box of this size should contain 4 layers of 6 rows of 4 apples each, making a total of 96 apples, or it should have 4 layers of 8 rows of 4 apples each, making a total of 128 apples.

Another box that is not very extensively used as yet is made of corrugated paper. This is a double box consisting of an inner shell which slips into an outer covering. The shape and size of this box is easily varied to hold any number of apples. And, possibly the greatest advantage of this particular box is that the

grower can establish a brand for his fruit and can market his apples so that they may reach the consumer in the packages in which they are originally started. And it seems that it should be the desire of every grower to establish for himself a name and a brand on the market.

Also, he should all along keep in mind the important fact that his sole aim is to so establish himself in his style and method of packing that he may be assured his apples, when packed, will reach the consumer without being injured by the dealer.

WORK FOR NOVEMBER.

By O. L. FARRIS, '14.

With the silos filled and most of the cover crops seeded and up, attention should be directed to the November work. The past month at the station farm has been a busy one; the winter crops have been seeded, and those crops harvested that were mature or would be injured by frost. Now we must look to those that require frost or cold weather to mature them. It is not necessary to wait, as some of our pioneer fathers did, until the corn has three hard freezes before gathering it, nor is it necessary to wait for any frost, but yet we often look for one before gathering corn because they have been associated with each other so long that we think the frost causes maturity of corn.

If the winter cover crops are not already sown they should be as soon as possible for we must realize that to obtain the full benefits of a cover erop, viz., 1st, protection to the soil from rain and erosion following the

freezing and thawing; 2nd, to use the soluble plant food thus preventing its leaching, and 3rd, to add humus and nitrogen to the soil, it must be sown early and get a good fall growth. Every day of delay in the sowing of the cover crop lessens the fall growth that much and just to that degree diminishes its efficiency in protecting the soil in winter. But as it is impossible to get a cover crop sown early on land where a fall crop it taken off late, we are often forced even with this late seeding the beneficial effects are not lost especially on fairly rich land, for a considerable growth will be attained during the warm days of winter.

Another very important work for this month is one which is generally overlooked by most farmers, that is, the cleaning and storing away of implements. This is the time of year when we stop using the majority of farm implements and they should be well cleaned, greased, oiled, repaired and stored away—not in some old shed with a leaky roof nor in a rubbish pile—but in a shed built especially and exclusively for the farm tools. The farmer should care for his implements just as the surveyor does for his instruments and the huntsman for his gun, for they are the farmer's instruments with which he earns his livlihood. Carelessness in this one thing is the source of much loss annually to our unsystematic farmers.

In storing away the farm implements we should see that everyone is in good running order. If it is not we should see that it is repaired before being stored, for in the spring

we may want the machine or tool and it will not be in order. We do not have time then to send for a piece or have it repaired so we are the losers of some very valuable time.

November is the general repair month on the farm. All summer the farmer has been "pushed" with work, and has not had time to repair anything. He must now repair his house, barn, fences, poultry house, etc., in order that his live stock may get the benefit of it during the winter months, and also that he may have it done before spring, when there is no time for anything except the necessary field operations and plowing, discing, sowing, etc.

WINTER CULTURE OF STRAWBERRIES.

By J. N. GILMORE, '15.

Of the small fruits the strawberry is receiving by far the greatest share of public attention. The strawberry makes provision in the growth of one season for the fruit crop of the next, and the soil upon which this profitable crop is grown should be of good fertility, drainage and have preferably a southwestern exposure.

At this season of the year the careful and successful berry grower is considering plans for the winter care of his strawberry beds. We have found several methods to be beneficial in Tennessee. Among the large commercial growers, the practice of top dressing beds in the fall with stable manure is the common one. The practice is a good one but is a very costly one as in too many instances a sufficient supply of manure cannot be economically obtained. It has been found that manure applied

at the rate of one carload per acre will cost approximately \$30.00. On the other hand if we apply \$7.00 worth of some concentrated fertilizer, say bone meal or nitrate of soda, we will obtain better results, producing earlier and better fruit. The fertilizer should be applied in the spring previous to the period of flowering. Availability of plant food at the critical stage of production is the determining factor in this instance.

Besides application of manure and Commercial fertilizers, mulches of vegetative material such as straw, hay, leaves, marsh grass, and even cotton seed hulls, are commonly used. Fall or early winter, November, is probably the best time to apply the mulch.

Straw is objected to as a mulch because it contains many weed or grain seeds. When leaves are at hand it will pay to use them, but straw must be thrown over them to keep the wind from blowing them away. Marsh grass being heavy, is also used very cheaply and advantageously.

Mulches are used mainly for protection against severe winters and to insure clean bright fruit the next season. The mulch of leaves, etc., adds comparatively little fertilizing constituents to the soil except humus. Therefore it is profitable to apply 200 pounds of nitrate of soda in the spring, sprinkling it on when plants are dry and dusting it off the leaves with a broom to prevent any burning of foliage.

The mulch should be allowed to remain between the rows during the picking season, next year as it will protect the fruit and prevent the ground from becoming cloddy in rainy weather. However, it should not be allowed to cover the plants themselves after they begin to grow in the spring as bleaching will occur.

Strawberry plants, intended for sale the following spring, may be dug soon and "held in," protected over winter by eight to ten inches of straw. If the plants are placed 25 or 50 in a bunch, orders may be filled next spring on short notice without the usual bother of digging in the mud and disagreeable weather.

THE DOUBLE CROP SYSTEM.

By A. G. THOMAS, '14.

The double crop system is a succession of crops such as will keep a crop growing on the land all the year. By this plan the land is never idle for as soon as one crop is harvested, the land is prepared and seeded to another. Such a system is of course only possible in the South where the winters are sufficiently mild to allow cereals and crops to grow. This system is now practiced and advocated by most Southern experiment stations and by a few farmers.

There are several advantages of the double crop system: it adds humus to the soil, even though the tops of the plants are removed from the soil, still the roots are left to decay and form humus, which is the main moisture preserver; its helps to eradicate weeds by the frequent breaking and cultivation of the land; it is an intensive method of farming and increases the income per acre by providing more feed or crops from an acre during the year. For instance, barley may follow corn in the fall, to be harvested, and followed by cow peas or soy beans, which in turn is followed by wheat or some other crop to plow under.

It is not a good idea to take every thing from the soil and never put anything back; once every three years the winter crop should be turned under to add to the fertility of the soil. It looks like a waste to plow under a nice crop of oats, wheat, vetch, or barley, when it could be harvested and sold for a good sum, but it will doubtless double the yield the next crop.

The double crop system is only carrying out this system of rotation. One year silage with cover crop in winter, next year soy beans or cow peas followed by a green manure crop. With this rotation there will be the greatest amount of feed produced and by turning under some of the winter crops in the spring there will be an increase in fertility.

The greatest disadvantage of the double crop system is the need of more labor and live stock, but if the live stock used is mares, the increase of colts will be a profit in

itself; another disadvantage of this system is that it keeps the land plowed or cultivated all of the time and might thus be more inclined to wash; and lastly, when weather conditions are unfavorable it is sometimes difficult to get the crops seeded in time. Even with these disadvantages it is being used more and more and will be used much more in the future.

NEWS ITEMS.

Prof. and Mrs. C. A. Willson have the sincere sympathy of the entire student body in the death of their baby girl.

Mr. A. S. Adsmond, '12 has accepted a good position as manager of "Fortland Farm," owned by Dr. R. E. Fort, Nashville, Tenn.

Prof. S. M. Bain is spending several days in Middle Tennessee for the benefit of his health.

During the past few weeks, Professor Morgan has been lecturing at various points in East Tennessee.

Prof. C. A. Keffer, returning from the fair at Mountain City, reports one of the nicest and most enjoyable fairs of the season.

Mr. W. M. Landess and bride, made a short visit on the Hill recently. Mr. Landess was a former "Ag." student of the University.

Prof. S. H. Essary was in West Tennessee making selections of Japan clover seed from several coun-

ties, with the idea of establishing a new variety better suited to Agricultural needs.

Miss Lena B. Henderson succeeds Dr. E. S. Reynolds as instructor in botany.

Several changes have been made in the agricultural faculty this year. Prof. C. A. Willson is assisted in dairy instruction by D. T. Hardin, fellowship student from Clemson College, S. C.

Mr. L. G. Willis of Mass. Agricultural College, has been secured as assistant soil chemist for the Experiment Station.

The orchard exhibit of the Southen Railway at the Morristown and Sweetwater fairs was in charge of Prof. C. A. Keffer. Their dairy exhibit at these places in charge of C. A. Hutton.

Prof. C. A. Willson judged live stock at these fairs and was accompanied to the East Tennessee Fair at Sweetwater by Hardin, Hinshaw and Cleveland.

THE U. T. FARMER

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Published Monthly by the Agricultural Club of the University of Tennessee.

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EDITORIAL.

The days are getting short now and often too disagreeable for outdoor work, yet there is much that may be done when the bad days come and also during the long winter evenings when the fire crackles merrily on the hearth and the whistling wind sucks the mirids of gay sparks into the chimney. When is there such a good chance to study your profession—to study the science as well as the art of farming? This seems to be a natural pause in which we may look back over the year just gone and estimate the profit and losses, the mistakes, the successes, and then look forward and see how we might make improvements.

Are your fields producing the maximum yield of food nutrients per acre or per dollar expended? Is your soil gaining or losing in fertility and do you know why? The average corn crop of Tennessee costs five cents per bushel more to produce it than the average selling price.

Here, indeed, is a great field for improvement. Are you raising the breeds of live stock that are most adaptable to your type of farm? Are your dairy cows returning you dollars for feed and care or are you boarding them for nothing? These questions and hundreds of others should receive attention during the winter. For answer do not go down to the cross roads store and tell tales all day long to the "cracker box brigade" but put pencil and mind to work with paper and books.

There are books you will need to help answer the questions; books on feeds and feeding, books on dairying, live stock and breeding, books on manures and fertilizers, and soil fertility, and soil management, books on crops, perhaps a dozen books in all and bulletins on these subjects or others that apply especially to your line of farming, which will be sent from Washington free for the asking.

Many farmers feel that they can hardly afford to send their boys off to school to take a complete course in Agriculture, but these boys, by attending one of the short courses which will be held in this state, will receive such valuable hints and insight into the fundamental principles of agricultural science, that they will be able to study books pertaining to these subjects and find them extremely interesting as well as profitable. If this study did not add a dollar to the farm receipts it would be found exceedingly interesting and bring out new thought that would add life and spirit to farming and make it a fascinating life study. Such a course would develop character and lead to better citizenship, especially when books of general cultural interest were added to the list. as books of travel, biography, history, romance and fiction.

Corn alone is not a proper feed for growing pigs or for sows. In the first place the high percent of oil and starch make it so unbalanced that it cannot be as perfectly digested as a better balanced ration. Again, in the case of sows, it makes them too fat to breed well or to produce milk. The sow giving milk needs food rich in protein and mineral matter. Why is this? because milk is especially rich in protein and mineral matter. there is a reason why it must be so. The young growing animal needs a large proportion of bone and muscle making elements in its food. The faster he grows, the more he needs. For this reason if the pig is to be kept growing after being weaned, he must continue to receive bone and

muscle making feeds-protein and ash. In a discussion of rations, the subject of ash is often omitted and hardly mentioned. This is not be cause its value it not recognized. but because almost all feeds rich in protein are rich in ash. The problem is thus simplified. Corn is an excellent feed for all classes of farm animals, young or old, but it furnishes only one side of the animal's needs; protein supplying feeds must be fed with it and especially is this true in the case of rapidly growing animals or those giving milk.

This is the time of year for the farmer to make his plans for the future. It is a mistake to wait as so many do until planting time before deciding on what crops to raise and where to plant them. Make plans now that you can follow next year. Of course the details will have to be changed occasionally during the season and you will not be able to follow a plan in every respect, but well thought out plans will be a great help and by then you will be able to accomplish much more satisfactory results and with much greater economy.

The dairymen of East Tennessee met at Knoxville, Aug. 24, and organized the East Tennessee Dairymen's Association. The objects of the association are to promote cooperation among the dairymen in the purchase of feeds and marketing of products, and to stimulate a greater interest in dairying throughout East Tennessee. The meetings are held at the Experiment Station on the first Saturday in each month, at which time various prob-

lems of vital interest to the dairy-man are discussed. At the last meeting addresses were made by Professors Morgan and Willson. Every dairyman in East Tennessee should join this association and attend the meetings regularly. In addition to the regular programme, the visitors derive much pleasure and profit from an inspection of the farm, barns and dairy building.

The County Fair.

In this progressive age we are prone to give undue attention to the big events of the day without giving much thought to the small affairs. In no line of our activities is this more true than in regard to county fairs. In our enthusiasm over the state and national fairs, we forget the small, home fairs, and those in which we should probably be mostly interested.

That the small fairs may be made a very potent factor for the advancement of social and educational conditions in the county was well demonstrated at the Sweetwater Fair early in October. The little town is situated in one of the most fertile valleys in Tennessee, and the fair brought out the best products of these rich farms in great abundance. Dairving is the principal line of farming in this valley and there was a splendid showing of Jerseys. All the exhibits in the different departments were exceptionally good, showing that the people of this section are awake to the value of the fair.

The fair grounds, one mile out of town, are beautifully located and well kept. The buildings are plain and substantial, amply large but without waste room. The visitor is at once impressed with the neat and cleanly

conditions of the grounds and buildings.

A new feature of the fair this year was the educational and instructive exhibit of the Southern Railway, consisting of a model working dairy, an orchard exhibit and a booth devoted to domestic science demonstrations.

This is only one instance of the many ways in which the Southern is trying to stimulate better methods of farming along its lines. The exhibit attracted much attention and interest on the part of the visitors, and the management hopes to make this one of the permanent features of the fair.

At the large fairs the crowds are composed principally of city people and curiosity seekers. But here was a county fair patronized by country people, who came for miles, bringing well-filled baskets of good things to eat for the noon-day lunch. It is a caution to see these good, old-fashioned basket dinners spread out in some inviting nook, but,—well, the proof of the pudding is in the eating.

The fair was a model one and the management is to be congratulated upon the success of the undertaking.

The following is the list of points where short courses in agriculture will be held in Tennessee and the date. These short courses are under the direction and supervision of the University.

Columbia	Nov.	11-16
Clarksville	Nov.	18-23
Brunswick	Nov.	25-30
Jackson	De	c. 2-7
Paris	Dec	. 9-14
Livingston	Dec.	16-21
Sevierville	Dec. 30-	Jan. 2

We wish to correct an error in the October number of the Farmer. The article on "Preparing for Winter Eggs" was written by Earl Best and not by J. N. Gilmore.

At the beginning of the present term, the agricultural elub printed a neat little folder with the programs for the entire fall term, and placed one in the hands of each "Ag." student on the Hill.

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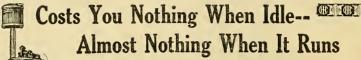
Other manufacturers have been changing their grain from time to time, first trying out a coarse grain, then a fine grain, each change claiming that this particular grain was the right one. It is evident they were not satisfying themselves or their customers, else, why these changes?

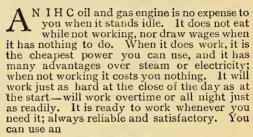
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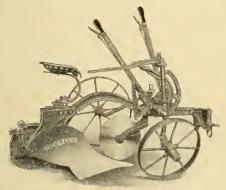
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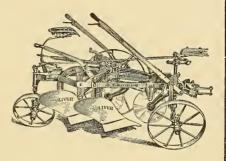


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U.T. FARMER

SHORT COURSE NUMBER



Judging Horses at U. of T.

Vol. VII.

DECEMBER, 1912

Published Monthly by

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Judging Cattle at the Farmers' School.

THE U. T. FARMER

Vol. 7. DECEMBER, 1912.

No. 3.

THE SHORT COURSE: WHAT IT HAS DONE AND IS DOING.

By PHIL. S. TAYLOR, Embreville, Tenn., Short Course, '12.

The annual Short Course in Agriculture given at Knoxville each winter was designed for those who need it most. I refer to that large class of country folk who own small farms, have small incomes, do most of their own work and have little time for anything else. Those whose wealth is greater have time and means to take the longer, more thorough agricultural courses given by the University. But unfortunately a vast majority of young farmers are too poor to afford these long courses, and to them the Short Course makes its strongest appeal. Because they are poor, its expense is small. Because they are their own laborers, it comes in midwinter when they can best spare time to attend, and because they must be intensely practical in their farming, more of the practical than the technical and theoretical is taught. So the Short Course has been through its comparatively few years a meeting place each winter for those who come to learn how, in a better way, to do the oldest work of man. Let us consider a few of the lessons it has taught.

1st. It has given young men a better knowledge of soils. The average farmer knows little about the composition of the soil he tills and just as little about its needs. For generations he has made no distinction between clay and loam and sand and has grown accustomed to administering to all with the same fertilizer

and tillage. The Short Course has shown him that soils differ in their composition and suffer from different ailments just as men differ in their physical make and in their ailments. And as a physician administers to each patient according to that patient's needs, so the Short Course would have the farmer prescribe for each acre according to its needs.

2nd. It has given him a better knowledge of crops and of live stock. "Pigs is pigs and crops is crops" has been the prevailing philosophy of the ordinary farmer. But under the enlightening effect of the Short Course he has come to realize that there are crops and crops, and pigs and pigs and also that his ultimate success hinges upon his knowledge of their kinds and breeds and treatment. The difference in value and usefulness between the scrub and the pure-bred in live stock has been made so plain to him that he never forgets. And that there are just as many "scrubs" in a bag of ungraded seed wheat and unselected corn as there are in a herd of cattle is preached to him and shown to him earnestly and tirelessly.

3rd. It teaches the value of systematic rotation. The besetting sin of most farmers is their lack of system. Too many of them farm with an eye simply for the present year and take no thought of the years to come. The result is depleted fertility and steadily decreasing yields. The Short Course would have us plan years

ahead and grow upon each field, in proper rotation, a series of crops which would enrich rather than rob the soil. The Short Course student will hear much of the new Agricultural trinity—lime, legumes and live stock. Lime for legumes, legumes for live stock, and live stock for land. To be permanent, our farming must feel the magical influence of this trinity which alone can prove the salvation of our worn and wasted Southland!

4th. The Short Course Implants Ideals. No man can succeed who has no fixed purpose and no ideal. To me, perhaps the best feature of the Short Course was that the thoroughly

practical knowledge it offered students was also the means of implanting ideals and shaping purpose. What one learns there of the common things of every day life is apt to make him see that, after all, every day life is neither common nor dull and that there are no common things! Running through all its "practical sense and sensible science" is a golden strand of sentiment that enriches and enables life. The instructors would fill us full of the knowledge and the love of the farm and its life, but in doing this they would also make the farmer himself a better. nobler, manlier man.

SOME ADVANTAGES OF A SHORT COURSE IN AGRICULTURE.

By EUGENE C. WALLER, Madison, Tenn., Short Course, '12.

One of the most widely discussed deficiencies of modern education is the failure to connect theory and practice. In Agriculture, as in other subjects, the study of theory has its proper place, but it should be ac companied by ample opportunities for experimentation. A winter's short course, giving thorough instruction in the elements of farming which the student may put into practice on his own home farm during the remainder of the year, is a most excellent plan for the combining of learning and doing. To the farmer, young or old, who, for the lack of time, money or previous school privileges, is deprived of a more extended education in Agriculture, the short course should especially appeal.

Every farmer should keep informed about the latest thoughts and practice in his line of work. Those in charge of the Experiment Station of the University are constantly seeking to solve the many problems met by the farmer throughout Tennessee and the results of their experiments are available to the short course students. By observation at the Station they may gain a great deal of first-hand information on the latest farm implements, the most approved dairy facilities, and the best farm crops, stock, fruits and vegetables. Each subject in the course is taught by a specialist who not only lectures, but gives demonstrations as well. One is thus assured of receiving the most valuable and up-to-date instruction.

Coming as it does during the months of January and February, the course may be taken with little financial loss at home. The question to be decided by one who contemplates attending it is not, can I afford to take it? but, can I afford NOT to take it? One of the members of last year's class who owns and personally supervises the work on a farm of several hundred acres, told the writer that while he lost many dollars at

home every day he attended the lectures, yet what he gained was worth much more than the time and money it cost him. If he couldn't afford to miss it, can you?

No man ever accomplishes anything worth while in life without enthusiasm. If you want to get a new inspiration to put into your work attend the short course. Enthusiasm, like smallpox, is contagious. The men who will instruct you are not only well informed but they are ex-

ceedingly enthusiastic about it, and two months' association with them will beget in you their spirit and earnestness. If you like farming, come to the short course. If you don't like it, come anyway. Come and learn about deep tillage, cover crops, lime, alfalfa, how to judge a dairy cow, the best fruits and vegetables to grow in your section, and a host of other valuable things. Be a booster for your community and the grand old State of Tennessee.

THE FARMERS' SCHOOL

By H. P. OGDEN, '13.

Something new. We are always looking for something new. This is what makes progress. Everywhere men are making discoveries and improvements. Luther Burbank's whole life is a search for new plants. Thomas A. Edison is just one among thousands who are putting new inventions into the world. It is the business of the Experiment Stations to learn new truths or rather to reveal those that have always existed but unrecognized. New conditions of life are coming up each day. Today is not yesterday nor can it be said what tomorrow will be. day we are called upon to meet some new situation and face some new opportunities. Do we utilize them? Are we on the out look for something better? Or are we satisfied to let things go along in the same old rut?

If we wish to be successful we must be always on the outlook for something better and grasp it when it comes. Of course one man will see a new thing before another does, perhaps because he is so fitted by nature or perhaps because he has had training which enables him to see new and improved methods before his neighbors do. Perhaps he has better judgment as to the probable success of some new method because he is better informed along lines of good farming.

It is the object of the Agricultural Short Course to bring before the farmers new ideas, and also to each them how to judge correctly as to the probable merit of any new plan. In short we all need our eyes opened occasionally. It seems to me that one of the great advantages of the Short Course in Agriculture is the association with those whose whole life work is discovery and progress. There is a great stimulus derived thereby that is very helpful to the man who works day after day alone and oftentimes very laboriously for the necessities of life and with few of its luxuries.

While this inspiration or the improved sentiment toward farming is important, we must not forget that farming must pay. If farming is not profitable there will be little sentimental attachment for it or little interest in anything connected there-

with. The Short Course teaches how to make farming profitable. The lectures are practical and as many of the lessons as possible are made eminently practical by actual demonstration in the field or by use of the live stock.

The Short Course was organized in 1900 with a registration of twenty students. From the beginning the interest manifested by the students has been marked, and its growth steady and regular. During all the vears since the Short Course was established, the professors of the Agricultural College have spent much of their time in extension work, attending farmers' institutes and conventions, holding brief short courses in the different towns, writing for the agricultural press, and co-operating with the farmers in all parts of the State in experimental demonstrations of improved methods. Gradually the College has gained the confidence of Tennessee farmers, and its leadership is now everywhere recognized.

During the twelve years of the winter Short Courses here there have been sixty-two counties of the State represented and also fifteen different States. The winter Short Courses come when the farmer has most leisure and the summer Short Courses in Agriculture are carried on during the summer at a time most available for teachers.

This year the regular Short Course at Knoxville will be preceded by a "Farmers' Week," January 6th to 11th. This will be held in Oliver Perry Temple Pavilion, situated on the Station Farm and from 1,000 to

2,000 farmers are expected to attend. The faculty will be assisted by distinguished lecturers, prominent breeders with their herds, and men in every line of agriculture.

More and more is the Short Course recognizable as a real and integral part of the College of Agriculture and the State University. For this reason the December issue of the U. T. Farmer has been dedicated to the use of the "Short Horns." The object of the U. T. Farmer is to bind the College of Agriculture and the Experiment Station more closely to the people of the State. The College of Agriculture is free, it belongs to the State, it is yours. Therefore the U. T. Farmer is yours.

What are you doing to make your paper a success? There is a great deal you might do. This paper to be of real use to anybody and fill its offices as a University paper must be intimately connected with both the people and the people's University. It will be a great day for the College of Agriculture and the University as a whole when each citizen of the State feels that this is his institution. It will also be a great thing for the State at large. What can you do to help the U. T. Farmer? gest criticisms to us that you think will aid us to make improvements, advertise us to your neighbors who do not know that this is their paper and support those who advertise in our columns. We should like to increase our subscription list by a thousand new subscribers during the next two months. We can do it if we will all work toward that end.

SHORT COURSE OF BENEFIT TO WOMEN.

By MISS NELL E. MANN, Martel, Tenn., Short Course, '12.

It is my earnest wish that every girl and woman who reads this magazine may have the opportunity to attend a part, if not all, of the Short Course of 1913, as it will certainly be to the advantage of any one interested in farming and farm life. Given a more intelligent knowledge of the scientific side of farming the woman of the farm will get much more of both pleasure and profit out of each day she lives there. She will also more fully realize how very fortunate she is, to have the opportunity of living in the country, instead of a noisy, crowded city, where the real pleasures of life are so often lost sight of in the rush and hurry. Beyond a doubt the Short Course is a great factor for increasing the abilities of women for their life on the farm.

One who has never attended the Short Course cannot imagine the multitude of things to be learned about all branches of farming in so short a time. And I feel sure the majority of those who have attended before, will make every effort to do so again.

It is well for the woman to show interest in the man's work, and the farmer should show interest enough in return to give his family as many of the time and labor-saving devices as are within his income. The country is certainly the most healthful and interesting place to live. Why not make it also the most comfortable? It will surely pay, for it is not the hard labor which causes so many young people to leave the farm but in nearly every case it is the lack of attractive and convenient homes and social pleasures. To have these would cost very little money, and the result in most cases would be very satisfactory giving as it would, more happy and contented young people on the farms.

Too often we see a family selling their farm and moving to the city upon the death of the husband and the father, because of the fact in most cases that the women of the family are not qualified to "take hold" and farm intelligently. That a woman can make this line of industry a paying proposition is being proven by numbers of successful women farmers all over the country.

I should so like for every girl who wishes it, to have a thorough course in Agriculture as well as Domestic Science. But as this is often impossible I can recommend no better place of learning than the Short Course for Farmers and no more enthusiastic teachers, than the agricultural professors of the University of Tennessee.

AGRICULTURE IN THE RURAL HIGH SCHOOLS OF TENNESSEE

By VERD PETERSON, Murfreesboro, Tenn., Short Course, '12.

With all that has been said of late years concerning the teaching of Agriculture in the High Schools of the State it seems useless to insist upon its introduction. Yet the very fact that only three or four counties in Tennessee are doing any real work of this kind indicates that something should be either said or done to hurry the work along.

Probably the first thing to find out is what is retarding the movement.

From all indications it is not because the patrons to be served by the schools are not ready for this type of work nor is it because the undertaking is hopeless. The first factor opposing the teaching of Agriculture in High Schools is that the people of Tennessee in general are not in close enough sympathy with the type of education represented by Agriculture, to invest their time and money in it. There is too much of the traditional hanging on to our school system and demanding attention to leave room for more modern things. There are too many people who do not want to tan their faces or soil their hands with earth. In the second place the teachers in the High Schools of the State are retarding the movement both because they are not prepared for the work and because they are not willing to do the hard work necessary to make the movement a success.

The remedy for each of these conditions is for all hands to get busy, to learn about the work and become so interested that nothing can stop its progress. Some times there may be some damage done to the cause by its friends and workers trying to stress the economical side too much. Leaving out all economic considerations the Biological and Agricultural Sciences have as good reasons to be taught in our schools as any subject whatsoever unless it be that of English or Literature. With the economic value added it seems hard to find a just cause for doing so little. seems strange when any country community will pay out the most of its money for the teaching of Latin and Mathematics and little or none for the teaching of Agriculture. We cannot hope for much better work from the teachers themselves until higher salaries are offered as inducements to prepare themselves for the work of teaching.

As to the kind of Agriculture which should be taught there is but one kind of Agricultural material suited to school work and that is the kind that teaches the fundamental principles of rural life and of the common farm operations. Any thing that smacks of the back-to-the-farm movement as carried on by the selfish consumer or real estate dealer is a farce. No teaching of Agriculture that points out only the beauties and bonanzas of farm life without giving the principles and the impetus necessarv to master the numerous difficulties will ever do much good.

It is highly necessary that a good deal of Science, especially the biological sciences, be taught in its relations to Agriculture but mere Agricultural Biology and Chemistry will never suffice. Too much of this is neither Biology, Chemistry, nor Agriculture but rather a patchwork of unauthorative Science. To be of the most value the subjects should be taught by people who know both Agriculture and Science. In fact the only man who can teach Agriculture is one who knows the sciences as a foundation.

In order to do the rural communities much good there should be much pure Agriculture taught. By pure Agriculture is meant the principles and practices of farm life. The farm operations to be emphasized depend largely upon the interests of the community and the nature of the farming suited to that community. In West Tennessee it would be cotton, other field crops, and stock feeding perhaps. In Middle Tennessee grazing, dairying and horticulture would

be emphasized while in East Tennessee more fruit growing, trucking and forestry. Each county has its interests and possibilities and the school should assist it in making the most of them.

Since for the teaching of any Science a laboratory is necessary, the High School must have a laboratory for Agriculture. The only very valuable laboratory work must be done upon a farm. For this reason the High School must have a farm, not necessarily a large farm, but one on which the common operations of the farm can be demonstrated.

No teaching in any school is worth much unless it reaches farther than the walls of the school house and the limits of the grounds. This is more than true of Agriculture. The Agricultural work of the High School should be extended to the farthest limit of the district or county to be served. This can be done by the school interesting itself in all organizations intended for improving farm life and by extending the work to the farms and into the homes of the pupils.

The teacher of Agriculture should be employed for the entire year and should be paid enough until he can afford to spend all his time at the work. He should assist in the Corn Club work in co-operation with the United States Demonstration agent. He would do well to organize Juvenile Clubs in such work as Poultry, Gardening, or any other local interest, always bearing in mind that the purpose of the High School is primarily to serve the people who create and support it.

With many schools which have not begun the work of Agriculture it seems a hard matter to decide just how to begin. Of course the how of the starting is important, but the fact of the starting is probably more important for we do not go forward standing still. Where the attitude of the school and the community is not right for the work the best thing in the world is to get busy and change this condition. A few mistakes may follow, but with them will come enthusiasm and knowledge and the justice of the cause will never let it die.

In the Rural High School of the future in Tennessee there is going to be more that touches rural life than at present. Not only will the subject of Agriculture be taught in its different phases, but Domestic Science and Home Making, together with much to better the present social and religious conditions in the country. The High Schools must teach more of the science of living in the country and do more to elevate and make endurable country life or it will not be able to show its excuse for existing. The time is coming when rural people are going to believe more and more in an education that fits their boys and girls for rural life and they are going to be willing to pay for it. They are going to demand the best from the schools and the teachers and the teachers who expect to teach in the High Schools of the future had just as well get ready to do the kind of work demanded. The school and the community are more and more becoming one and as this happens Agriculture and those subjects that improve country life are coming into their own, not to take the place of the traditional and classical subjects but to supplement and to enrich them.

DAIRYING IN SWITZERLAND.

By OTTO GATTIKER, Knoxville, Tenn., Short Course, '12.

Climatic relations depending on geographical situation and altitude above sea level, a good soil and favorable distribution of rainfall determine Switzerland as one of the leading countries in cultivation of forage, in cattle breeding and in dairying. These branches of industry provide the greater part of the income of the Swiss farmers, and only a small number of them make their living from wine-culture or other types of farming.

Numerous cheese factories and creameries, supplied with the best implements, are scattered throughout the whole country and sell and make into butter and cheese considerable quantities of milk, some of them more than 50,000 quarts daily, delivered from long distances. Besides these creameries, there are several large concerns making condensed milk.

A great amount of milk and its products is used by the relatively large population which is about four million. The total area is 15,900 square miles of which more than one-fourth is high, unproductive mountains covered with snow and ice throughout the year.

The total annual export of milk and milk products to all parts of the world amounts to over \$25,000,000.

The retail prices in Switzerland at the present time are: Sweet cream butter (unsalted) 44 to 48 cents a pound; good quality swiss cheese, 24 to 26 cents a pound; whole milk, 6 cents a liter, which is a little more than 2 pounds. Farmers get about 4 cents a liter delivered to the creamery.

The rest of the milk, after making butter and skimmed milk cheese,

or cheese from whole milk, is called whey. It contains 4 1-2 to 5 per cent sugar and a small quantity of ash, and is mostly fed to the hogs with crushed and steamed corn, rye, barley, potatoes and beets.

Several large creameries extract the sugar by evaporating the whey. The substance obtained after this process called "sugar sand" is dried thoroughly and after chemical purification, sold as pure milk sugar, retailing from 80 cents to \$1.00 a pound.

These many million gallons of milk are produced by chiefly two distinct breeds of cattle:

- 1. The Brown Swiss (bos brachyceros) in the Northeastern and Southern part of the country, and
- 2. The Simmenthaler or Fleckvich (bos frontosus), a white and red, or white and yellow spotted breed, in Northwestern Switzerland.

There is in the canton of Freiburg a small breed of black and white spotted cattle.

The Brown Swiss, as well as the Simmenthaler are good for milk, beef and work, which qualities make them valuable. They show a combination of somewhat coarse bones, with a strong muscular development but well proportioned body. Both breeds are distinguished by a high constancy of inheritance in form and qualities. The Brown Swiss, also raised in some of the Northern states of the United States produce on an average from 7,000 to 8,000 pounds of milk with 3.6 per cent fat, and the Simmenthaler not much less, although the latter breed is heavier.

	BROWN SWISS		SIMMONTHALER	
	Weight Pounds	Value for Beef	Weight Pounds	Value for Beef
CowBull	1,200 to 1,400 1,800 to 2,400	\$162 to \$216	1,400 to 1,600 2,000 to 2,800	\$180 to \$252
Fat Steer Three Years Old }	1,800	\$216 to	2,200	\$264

A fattened calf of 12 weeks weighs easily 300 pounds and sells for from \$50 to \$60.

The price of a good milk cow is now \$160 to \$200, and thousands of pure bred heifers and cows are sold every year to Germany, Hungary, Italy and Russia for from \$300 to \$400 a head.

"PURE BRED LIVE STOCK."

By H. L. PATTERSON, Guthrie, Ky., Short Course, '12.

While men look for pleasure in their work, yet there must be a certain degree of financial success to make any employment satisfactory. We want profits, the most we can get. In fact, with every business being adjusted to meet the pace of modern progress, the dairyman who is satisfied to work along in the old rut made by the dairy wagon of his forefathers will eventually meet the sheriff at his door.

Five years ago, after I had been in the dairy business a year, my attention was called to the account of a dairyman who had just held a sale in which he sold all his cows that were high producers at a very low figure. His summing up of the sale was that had these animals been registered they would have easily brought from \$150 to \$300 more per head. For years had culled and tested and built up his herd of grade cows only to find that they were valuable merely so long as they remained in his possession and that when put upon the market of buying and selling values they were really only so many grade cows.

I think this one incident more than

any other made me determine to own a herd of not only high producing cows but cows that had a foundation behind them. To illustrate what I mean: Some time ago I bought a grade Jersey cow; she proved to be a high producer. I would liked to have had more of her stock. Where could I get it. No one knew. Her ancestors were unknown, nor could those of the same generation that were related to her be found.

Not being able to buy a herd of registered cows I purchased a heifer calf from the Station and raised her with the intention of breeding and building up a herd in this way. At the same time one of my best grade cows calved and the two heifers were raised together. They freshened a few months apart and I milked them through their first period of lactation and when the grade cow came fresh her second time and the registered cow was due to freshen in two months, I decided to retire from the dairy business and had a public sale of all my stock and dairy outfit. The grade cow three years old, of fine form, with large udder and looking more attractive than the registered

brought \$65.00 while the registered cow, nearly dry, sold for \$131.00. At the same time the registered cow's calf, ten months old, sold alongside a calf of the same age. This calf was a grade out of a cow that when fresh gave 32 pounds of milk per day. The grade calf was knocked off at \$28.00, while the registered calf hit \$71.00. All the buyers and bidders were local people. No effort had been made to advertise the sale outside of the community as there were only three registered head to be sold. I had grade cows in that sale that were as good and possibly some better than the registered cow that brought around \$50 as against \$131.00 for the registered cow. I am just returning to the dairy business, have a registered cow bought from Experiment Station whose record is 392 pounds and will be fresh in a few days, and have bought an interest in a registered bull all but one of whose dams are tested. couple more registered cows I shall have a herd. This is the way a prospective dairyman of limited capital must get established.

We hear so much said and see whole pages written about killing the grade bull, and buying a registered sire because the standard of the herd in this way is soon built up. Repeated tests have shown this to be true. Since this is true why not get a registered dam also? If half a loaf is good, why not the whole loaf?

But all registered cows are not high producers. The tremendous drop in prices at the sales of imported cows the past season demonstrates conclusively that the dairy people have learned that what it wants is a cow with a record. The day has gone or is passing when the mere registration certificate will bring a high price. Hereafter, there must be behind the certificate a record of achievement at the pail. For the dairyman the best prospects is a registered herd with scales and Babcock test. The old saw "tie your cart to the tail of a star" may well be changed to "tie your dairy hopes to the tail of a registered cow—the one that has a record" and you will make good.

WHY PRODUCE BEEF IN EAST TENNESSEE

By C. C. PROFFITT, Maryville, Tenn., Short Course, '09-'10.

There are at least two reasons why the farmers of East Tennessee should raise beef cattle. The first reason is that there is directly some profit in it; the second, that indirectly there is gain through increasing the fertility of his fields. The hills and valleys of East Tennessee are well adapted to grazing. Grass takes kindly to the soil and there is an abundance of running water. The climate is favorable, giving ten months of pasturage and mild winters. Roughage is plentiful and cheap and if our great beds of

limestone rock were utilized so we could grow clover, roughage would be still more plentiful. Small expediture is necessary for labor in grazing and stock raising so we can in this way help solve the farm labor problem.

Some one may ask can we afford to turn over land into grazing and roughage fields since the price of the land within the last few years has almost doubled? Perhaps the answer has come to him if he has noticed his neighbor this fall weighing cattle off the grass and counting a nickel for every pound.

The profit made depends upon the personal interest and attention given to the business, Especially should we remember that the typical scrub cannot be counted on for fastest growth or best cuts of meat, nor should the Jersey cow be expected to mother the beef industry of East Tennessee. We must get a beef type if we expect to produce beet at a profit, for the steer worth five cents per pound eats no more than the steer worth three and will generally weigh much more.

We must also remember that a steady growth of the calf is desired. The starvation plan for two years with a little topping off never made profitable beef.

The study of the markets in order to know when to buy and sell is also necessary for a profitable stock farmer. Knoxville gives us a fair market for beef of ordinary grade. Cincinnati and other cities are ready for our tops while Virginia clamors for our grazers. An East Tennessee farmer can make the business pay.

It is very hard for the average farmer to acknowledge the indirect profit, the soil building, from beef production as eash in hand, yet this is a source of great profit to the farmer. If more East Tennessee farmers would produce beef with the idea of increasing soil fertility, soon they would find it very profitable indeed. The extravagant idea seems to be, steal all you can from the soil and put little or nothing back. The wonder is that our soil produces as well as it does.

In grazing land there is small loss from washing, hence the stockraiser has stopped one of the chief factors that is ruining our hillsides. The manure adds to the fertility, crops are thereby increased and thus the farmer receives profit. Corn, stover, hay and ensilage with a grain ration of corn and cotton seed meal make it possible for the farmer to keep his cattle through winter months and get them ready for market if he wishes to sell in winter or spring.

The Short Course in Agriculture is telling the young men of Tennessee how they can improve their herds, build up their soil and at the same time make farming profitable. No young man on a Tennessee farm can afford to miss this practical course in Agriculture.

SOME ADVANTAGES OF RAISING SHEEP.

By JOE C. CLARK, Wartrace, Tenn., Short Course, '12.

Successful farmers have always raised sheep. As for back as man's history is recorded sheep have supplied him with food and raiment. Abraham, Lot and David were shepherds. The lamb was sacrificed for the sins of the Israelites and there are hundreds of tales of adventure, hardship and danger endured in the mountains and plains by the careful shepherd.

The people have not changed in regard to sheep and the conventional leg of mutton is a luxury for the tables of the wealthy today. This fact is a strong argument in favor of raising mutton, as every one knows that dealing in luxuries is the very best paying business. This also makes the mutton market generally independent of the prices of other stock; lambs may be selling at 7

cents when hogs are as low as 4 cents.

Little capital is required to begin and little expense incurred in production and crops are cashed at a time when our money is most valuable. I am referring to the raising of the spring lamb, which is the most popular method. Our location is almost ideal as we can get our lambs to market before competition is keen. We have all the crops necessary and the root can be grown here as well as anywhere; our bluegrass and clovers are especially useful and cotton seed meal can be gotten cheaply. Wheat,

barley, oats, clover and orchard grass form excellent grazing after lambing season. The crops are uninjured, and the soil is built up.

The sheep are the only means of utilizing these fields advantageously in winter. They are wonders as weed killers and can beat any man clearing up new land and living on the high, eraggy hills.

When taken at its farm value I feel I can safely say without fear of contradiction that the sheep is the best proposition that most of the Middle Tennessee farmers have.

POULTRY BREEDING.

By VICTOR D. CANEDAY, Short Course, '11.

Breeding poultry properly is no small business and requires the best thought and closest attention possible of any person who attempts to make a success of it.

There are plenty of poultry raisers in the business, and large numbers of them who call themselves poultry fanciers, but real poultry breeders will always be scarce enough to make plenty of room for men or women who are willing to put their hearts and brains into the business of the breeding of the very best quality of stock in any variety of fowls.

The true fancier values the practical side of the industry fully as much as the exhibition qualities of his fowls. It is absolutely essential that one breed from nothing but the hardiest, healthiest specimens; for once introduced into a flock, physical weakness of any kind will be a serious set-back for years to come, the trouble cropping out when least expected and often in the otherwise most desirable birds.

This question of properly selecting the individuals for breeding purposes is the foundation of successful poultry breeding. One positively must have the nerve to cull close and use nothing but the very best obtainable specimens in his matings if he expects to produce the quality that the world is hungry for and will pay good money to obtain.

In order to intelligently select and mate the best individuals from year to year, it is essential to keep individual breeding records and to know the ancestry of each individual. The use of trap nests for the purpose of pedigree breeding has greatly simplified the work and leaves no excuse for any one to follow the old haphazard methods of breeding.

By line breeding one gains uniformity in the flock that is difficult to obtain in any other way and establishes characteristics that he could hardly hope to fix in a flock by any method of breeding. It matters not what particular quality or trait one desires to strengthen in their fowls, whether size, vigor, prolificness or beauty, that quality will be most easily fixed and maintained by breeding from stock that has the trait established and has

been bred from individuals which also possessed the desired characteristic. For instance, a breeder desires to improve his flock in egg production. If he will select his best layers from the offspring of his best laying hens of the year before and mate them, he will find the egg yield considerably increased and the longer one continues to breed from the best producers that way, the more pronounced will become the power of his flock to reproduce uniformly good layers. On the other hand if one neglects to select for egg production while breeding in line for some other characteristics the flock strengthens itself in the production of poor layers.

Naturally the more points one aims to combine in one strain, the longer it is apt to require to gain the end in view, but health, vigor and prolificness are surely of as much, if not more value to the fancier, than to the practical poultry raiser and he is indeed short-sighted who does not aim first of all to breed for these three points which must be of first consideration to all poultry keepers.

In selecting breeding stock the most valuable individuals are those from family lines showing the most marked uniformity of characteristics. An individual possessing the desired quality is worth much more as a breeder if all of his or her brothers and sisters show uniformly good quality, than it would be if most of the brothers and sisters of the individual were of inferior quality. The power to transmit the individual's good points is very largely indicated by the quality of its own brothers and sisters. Uniformity is the most valuable characteristic work for.

When selecting breeding birds, the hens and cocks which have proved themselves superior breeders should be retained for use in the best matings and should be kept as long as they keep in good health and vigor. These healthy vigorous old birds are those that transmit to their progeny the longevity and rugged constitution which make the foundation for the most profitable families of fowls.

To select properly and mate intelligently good breeding stock of any variety of fowls requires an intelligent conception of what constitutes a typical specimen of the variety one is handling, but this ability comes by experience and by the study of the ideals as given in the American Standard of Perfection, and also the best specimens on exhibition at the best poultry shows, and in one's breeding yards. Where pedigree breeding is practiced and the best breeding stock reserved from year to year, the breeder is enabled to mate his yards with practically a certainty of obtaining desired results, whereas the poultry keeper mating his flock in a haphazard way can never definitely tell what kind of results to expect from his matings. In one system there is both pleasure and profit and in the other not very much of either.

All of the breeds of horses, cattle, sheep and hogs which have produced excellent families with the most desirable characteristics have been bred systematically along these approved lines and the same is true of the most prominent strains of the best producing fowls today and it will be increasingly true in the future.

In fact, any one who takes up the breeding of pure bred poultry in a systematic way and fits himself for intelligent selection and mating of his choicest breeders and puts his heart and mind into the production of the best possible in the variety of his choice will find real pleasure and profit in it.

GREATER PROFIT FROM FARM POULTRY.

J. A. DINWIDDIE, New Market, Tenn., Short Course, '07, '08, '10.

That every farm has chickens goes without saying. Census figures show that more farmers keep poultry than any other class of livestock. Whether or not more keep pure-bred chickens in comparison to pure-breeds of other classes of live-stock, I will leave for the reader to say. This we do know, that if it is to the advantage of the farmer to keep pure-bred cows or hogs. or I might say a true dairy type cow, or a true lard or bacon type of hog. looking to the greater profit derived from the increased flow of milk or more pounds of pork or lard, in the same sense we must consider the farm hen. She also, ought to be a purebred, having good constitutional vigor and a good representative type of the particular herd to which she belongs.

Do not mix breeds! It is hard enough to keep one breed true to type. The individual bird, be she ever so good, is just half the part in making profit, considering she has to produce a product, say an egg or meat. And as it takes feed to do this we must look well to the individual bird or birds to which we are going to feed this food. I repeat, if it pays to study the cow, the hog, etc., so will it pay to study the old hen. It certainly is not profitable to feed a mongrel flock of chickens that possess no vigor and have no definite type, either for egg production or meat production.

Again, it is not profitable to feed a mixed flock of different breeds and different ages, as we could not proportion the feed rightly to meet the needs of each bird. Ask the cattle feeder if uniformity, size and age has anything to do with profit. One reason why I try to make this point so explicit (speaking from experience) is that the average farmer tries to ignore these facts, and yet expects his birds to make a profit, while he does give careful attention to the feeding, breeding and care of the other stock that he keeps on the farm. In other words, we cannot secure good profits from poultry without good foundation stock to start with. And if we are going to keep chickens on the farm, let's have the kind with which we can make a profit.

The proper feeding of the flock is a problem within itself. Each feeder has his particular ration, yet there is only one good one and that is the one that produces the results. Corn. wheat and other valuable feeds, when fed alone will not produce the eggs, because they do not contain the proper proportion of nutrients which go to make up an egg. A ration made up of a mixture of these feeds and having a nutritive ration of about 1:4.6 will produce many more eggs, and is much better than the old "hit-ormiss' way of feeding.

In studying the subject of feeding, the natural feeds and the feeding habits of the birds should be considered. The composition of the feeds should be noted. One of the most essential parts of the ration for winter egg production is animal meal. The hen is a great insect eater and can supply herself in summer with plenty of animal matter in this way, if she has a large range. In addition to protein, this meat meal also furnishes plenty of phosphorous.

Water is a very necessary part of the ration and should be kept before the birds at all times. Lime is not present in grain feeds in sufficient amounts to supply the requirements of the hens, since as much as 11 per cent of the egg is lime. Lime should be supplied in the form of ground oyster shells, ground bone or ground limestone. Succulent feeds, such as vegetables, are relished by fowls, and are very beneficial on account of their assistance in the diges-

tion of other feeds. They also help to keep up the general health of the flock.

Thus we see why the "old hen" needs help and we must needs use as much science and common sense in breeding, feeding and caring for farm poultry as in the handling of any other class of farm animals in order to realize a good profit.

SHORT COURSE NEWS.

At date of writing there have been three one-week Short Courses. first one of the season was held at McMinnville. Professor Keffer reports a splendid attendance and a remarkably earnest, enthusiastic one. He was assisted there by Mr. L. R. Neel, Mr. W. M. Landess, both graduates of the University. Mr. Neel discussed soil, crops and fertilizers, while Mr. Landess was the chicken man, being a prominent poultry breeder of the State. D. T. Hardin, Fellow in Animal Husbandry University, gave instructions in Dairying. Also Mr. Jesse Tomlinson, Assistant Commissioner of Agriculture, assisted in the instruction. Many thanks are due to Mr. R. H. Horton through whose careful work and arrangements every thing went off nicely. Professor Claude Lowery was very helpful and co-operated with manager of the Short Course in the use of schools and by giving the speakers opportunity to talk agriculture to the rising generation. While there, the visitors had opportunity to see some of the best live stock of the country on the farm of Professor Turner also the fine Jack breeding farm of Mr. Bonner and oth-The live stock carried by the Short Course and under the care of D. T. Hardin also attracted much attention and proved a very great help to the instructors in demonstrating their lectures.

At Columbia, from November 11th to 16th, was held the second Short Course. Besides the regular corps of instructors, were Dr. M. Jacob, Prof. H. A. Morgan and Prof. D. M. Clements, Professor of Agriculture at Jones' High School, Lynnville. Professor Clements is very enthusiastic in the cause and gave excellent instruction as to forage crops for hogs.

Maury County is one of great agricultural wealth and influences. Her citizens sing the praises of her wheat crops, mules, Jacks, and every thing of agricultural value, and well they may, for where in the world can be found a better rural life? In this county of rich land and wonderful farms, are good farmers who have organized the Maury County Farmers' Club through whose activities much of the success of the Short Course was due.

As I write this the Clarksville Short Course is in progress. Professor C. A. Moores of this institution, and Prof. A. C. Morgan, of Kentucky, have joined the squad. The tobacco question is prominent here. Montgomery County is famous as a tobacco producing county. Professor Morgan is a regular tobacco man and is representing the tobacco interests of the Division of Entomology, Department of Agriculture at Washington, and is discussing tobacco rotation insects, etc., and investigating the

subject of establishing a branch Station in Montgomery County in cooperation with the United States Department of Agriculture and the Tennessee Experiment Station, which will be conducted exclusively for to-

bacco investigations. Superintendent S. L. Smith, of the Clarksville City Schools is also taking a very active interest in the doings of the Short Course.

NEWS ITEMS

Prof. C. A. Willson spent a few days recently at Jackson completing arrangements for steer feeding experiments at West Tennessee Station.

Dr. Brown Ayres and Prof. C. A. Moores, G. M. Bentley and J. F. Voorhees, went to Atlanta, November 11th, and spent several days attending the meeting of the Association of Agricultural Colleges and Experiment Stations held at that place.

Dr. J. F. Stanberry presented the Station with a very fine Duroc Jersey Boar a short time ago.

One of the heifers of the Experiment Station has just finished her first period of lactation with a record of 417 pounds of butter.

J. F. Stanberry and Sons will offer for sale during the second week in January at a public sale a very fine lot of Duroc Jersey guilts and boars. Watch for announcement in the January issue.

Prof. R. L. Watts, former Horticulturist of the University of Tennessee, now acting Dean and Director of the Experiment Station at the Pennsylvania State University, spent a couple of days here on his way to Atlanta.

Dr. H. J. Wheeler, Director of

Rhode Island Experiment Station visited the Station November 16th, as he was returning from Atlanta.

There were also two other visitors from Rhode Island, Dr. B. L. Hartwell, Professor of Agricultural Chemistry and Station Chemist at the Rhode Island State University, and Prof. A. E. Stene, Superintendent of College Extension work and Field Expert and Entomologist at the same institution stopped for a short visit while on their way to Atlanta.

Tennessee Academy of Science held its second annual meeting in the Library building of the University of Tennessee, November 29th and 30th. An interesting program was rendered and the meetings were well attended both by the members of the association and others interested in science.

The fourth annual meeting of the State Veterinary Medical Association, which met there Noember 21 and 22. was very well attended. Following addresses of welcome by Mayor Hill, Dean J. D. Hoskins and others, an excellent program of lectures and papers was rendered. After the close of the first day's program the association adjourned to the Colonial Hotel and enjoyed a delightful 'Dutch' lunch. Memphis was decided upon for the next place of meeting.

The class in Senior Advanced Stock Judging have enjoyed several very profitable trips this fall in the study of pure bred live stock. At the Idle Hour Farm near Knoxville and at the Bible College at Kimberland Heights. they judged Holsteins; at the Valley View Farms of Geo. W. Callahan, and at the farm of H. C. Camp, J. G. Sterchi and the Galbraith farm, Jer-They also saw fine blooded seys. stock of Berkshires belonging to Judge H. A. Ingersoll, H. C. Camp and J. G. Sterchi.

The Joseph Le Conte Scientific Society of the University of Tennessee has been reorganized on the plan of the club of the same name organized here in 1898. It is the plan of this society to give occasional open meetings to which the general public is invited. The first of these open meetings was held Tuesday evening, November 19th, and the audience was intensely interested in the illustrated lecture on color photography by Prof. S. M. Bain. Professor Bain has given this subject much study achieved very fine results. His color photos very truthfully depict the beauties of the Tennessee flora.

The College of Agriculture has again fitted up this fall a carload of first class live stock to be used in Short Courses now in progress throughout the State. Included in this car are two fine Percheron mares,

an Angus steer, Short Horn steer, Hereford steer, Jersey bull, Jersey heifer, Holstein heifer, Berkshire pigs, Duroc Jersey, also representatives of Southern and Dorsett breed of sheep. This is the finest car of live stock ever fitted up by the College of Agriculture, and is under the care of D. F. Hardin, Fellow in Animal Husbandry.

The finest lot of steers have just been received at the Experiment Station to be used in the feeding experiments this winter. In addition to the regular experiment with the "Steer Acres" there has been outlined a new set of feeding trials with stocked cattle in which 15 very fine yearlings will be used. This experiment will not be completed until November 15, 1913.

At the last regular semi-monthly meeting of the Agricultural Club, November 19th, following an exceedingly interesting and enthusiastic literary program the following officers were elected: President, C. A. Hutton; Vice-President, K. A. Neely; Secretary and Treasurer, C. M. Haenseler; Critic, H. A. Powers; Sergeant-at-Arms, H. P. Ogden.

These officers serve until the 1st regular meeting in February.

Oliver Perry Temple Pavilion is being piped for steam heat in preparation for the large attendance at Farmer's Week and the Short Course.

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EDITORIAL.

HOW do you like the "Short Course Number?" This is an experiment which we hope you will like.

BY the way, are you coming to the Short Course at Knoxville? This is the big farmer's school. The courses at McMinnville, Columbia and Clarksville have been winners this year. Never before has such interest been shown. It certainly looks as if the farmers of Tennessee have determined to make a great thing out of the Short Course. Have you seen the announcements for the Short Course at Knoxville this winter? If not, write to College of Agriculture, University of Tennessee, Knoxville, Tenn., at once. You can't miss "Farmers Week" any way. Everybody's coming.

OF course women come to the Short Course. The books show that 5 per cent of the Short Horns have been women. This does not imply that they shall go home and fol-

low the plow, ride the mower or even to superintend farming operations. Of course occasionally a woman has to take upon herself the management of the farm, in which case of course she needs to know something of the science of farming. But the demand for teachers who have a knowledge of agricultural sciences is increasing and many came for this reason.

THE fact that the courses continue I only 4 weeks, demands that a great deal be crammed into a short time. For this reason the student who gets the most out of the course is the one that continues to study after he has returned home. Again the course is strictly practical and considers little that is not directly connected with increasing the profit of farming. It has no time to consider either the cultural or social improvement of the student as do the four year courses. Hence it is important that this phase of the farmer's education be continued at home. Get in touch with the Free Travelling Library Commission at Nashville, Tenn. In this library are books on all problems of rural life as well as fiction, history, travel, etc. The question of profit is the first to be considered but this is just one of the many questions and in some sections very little if any more important than are the social and religious questions.

MAJOR'S Fancy Tormentress, one of the Experiment Station's Jerseys now on official test, has made 300 pounds of butter fat in 16 1-2 months, which admits her to Register of Merit in a little more than onehalf the time required. She made 53 pounds of butter fat in the sixth month of lactation and the indications are that she will make over 600 pounds of butter fat in one year. It is the policy of the Station to put all the Jerseys on official test. The dairymen through the country are demanding cattle with a production record as well as a pedigree. The breeder can not rely upon pedigree alone to sell his stock.

O N Saturday, November 23rd, the members of the Boys' Corn Clubs of the various counties of East Tennessee held a corn show at Oliver Perry Temple Hall at the Tennessee Experiment Station Farm, under the supervision of the Government Demonstration Department and Journal and Tribune, of Knoxville, to compete for prizes which had been offered by that paper. This was the first exhibit of the kind ever held in East Tennessee. It goes without saying that such a gathering was far reaching in its nature, and it is to be hoped that it will be made an an-Work of this nature is nual affair. doing a great deal towards showing the possibilities, and increasing the interest in raising the average yield of this crop.

The prizes offered by the Journal and Tribune amounted to \$125.00 in cash. The local prizes offered to the boys in the different counties amounted to approximately \$3,000.00.

The following program was carried out:

Corn Rotation—Prof. H. A. Morgan.

Corn Culture-Mr. C. F. Striplin.

A great Daily's interest in corn production—Mr. J. A. Dunn.

Selection of seed-Mr. Anderson.

The country for the country boy—Col. T. B. Thackston.

Judging of corn, and discussion of samples exhibited.

T the Experiment Station are Abeing conducted some very interesting tests with a subsoiling attachment by which it is claimed one man can do both the plowing and the subsoiling with one team, to a depth of 12 inches. So far the tests are very encouraging and we await with greatest interest their final verdict. This subsoiling problem must be solved and solved at once especially on these red clay soils which have been plowed only four inches for the last 100 years and have such a hard pan that they are practically impervious. Scientists tell us of the large amount of phosphorous, lime, potash, etc., that we are continually taking from the soil and loosing in the crops we sell. But how small these few pounds look when we think of the tons of the very best soil that the rains annually wash from out fields. It is this washing that is wasting our heritage, and anything which will in any way stop or even check it should be received with the greatest enthusiasm.

ALUMNI NOTES.

According to all indications the Alumni are very busy folks. In fact, they are so busy they scarcely have time to send in news items. We are all the time on the outlook for interesting Alumni news, and cannot allow such events as weddings or any other solemn occasions to pass unrecorded. But since these events occur but a per time in a life time we must be satisfied with events of lesser importance. Therefore Mr. Alumnus tell us where you are and what you are doing.

We had the pleasure of shaking the manly hand of Mr. Judd Brooks, '12, about a month ago. He was visiting the Hill during the installation of the new Agricultural Fraternity of Alpha Zeta. He is indeed a farmer of whom we are all proud and says the crops were good in his parts this year. He seemed glad to spend a few days on the "Hill" as well as in North Knoxville.

One afternoon early in November the University was pleased to recognize one of its Alumnae in the person of C. E. Allred, '12, fresh from Cornell, where he is taking his Master's degree and sprouting a beautiful mustache. For the benefit of those who were unable to witness the newly acquired facial adornment, we must say it is doing well and gives Mr. Allred quite a classy appearance.

In the person of A. S. Adsmond, '12, the University has an Alumni of great promise. Speaking of being busy at work, this is just what Adsmond has been. For a month he has been in training at the Station farm and now his hands are tough and his muscles firm for his work as

farm manager on one of the big dairy farms of Middle Tennessee, the Fortland Dairy Farm near Nashville.

Mr. L. R. Neel, '07, was on the Hill one day about three weeks ago, returning to Nashville from the meeting of the Association of Agricultural Workers which was held at Raleigh, N. C. Mr. Neel was the first editor of the U. T. Farmer and has always been interested in all kinds of rural problems. He is at present actively engaged in demonstration work, in cooperative experimental work for the Tennessee Experiment Station, lecturing at short courses and farmers' institutes and in editing the Southern Agriculturist.

An event of much interest to their friends was the marriage of Mr. A. T. Anders to Miss Robbie Roe on the 6th of November at Jackson, Tenn. Mr. G. R. Worthington, '09, was best man. Professor and Mrs. H. A. Morgan also went from here to the wedding. On their honeymoon the bride and groom spent a few days at the home of Mrs. H. A. Morgan, where they were beautifully entertained and met again many of the groom's friends. They will make their future home at Jackson, Tenn. Mr. Anders was a former student of Tennessee and since then has been engaged in eotton breeding investigations for the U. S. Government.

We learn that Rufus H. Felts, '12, is now numbered as a farmer. He is running the home farm at Spring-field, Tenn.

R. M. Murphy, '10, is making official year's tests of Jerseys in the Experiment Station herd.

On the 9th of November an event of no little importance to the College of Agriculture, was the installation of a chapter of the National Agricultural Honor Fraternity of Alpha Zeta.

The purpose of this Fraternity is to promote the best interests of the science of Agriculture both in the University and in the country at large, and always to make for the best and most useful citizenship for its members and its ideals are: Good Scholarship, Good Fellowship and Good Citizenship. The initiation requirements are of necessity somewhat high but this is one thing that makes it worth the effort of the lower classmen to be eligible.

The installation of the Morgan Chapter here at Tennessee was performed by A. Z. Gustafson, of Urbana, Ill., and George Livingston, of Columbus, O., members of the High Council of the Fraternity, who were assisted by C. G. Spencer, of North

Carolina A. & M., E Roberts, of University of Illinois, and H. E. Weisjohn, of Purdue University.

The following are the charter members of the Morgan Chapter: Judd Brooks, R. M. Murphy, C. E. Allred, H. P. Ogden, C. A. Hutton, J. L. Hinshaw, P. W. Worden, C. M. Haenseler, G. B. Thackston and G. E. Shelby, active members, and Professors H. A. Morgan and S. M. Bain, honorary members. Prof. C. A. Willson is already an Alpha Zeta man from Missouri.

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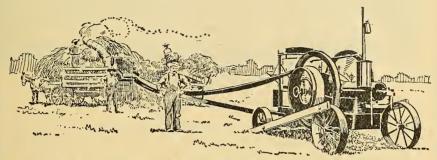
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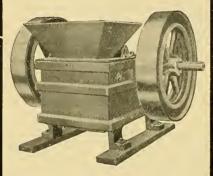
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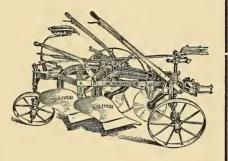


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THE FARMER'S CHALLENGE

L. H. BAILEY

Blow ye winds and lay on ye storms, And come ye pests in rabble swarms, And fall ye blights in legion forms, Nor yield my place one piece or jot;

For these are my lands,
And these are my hands,
And l am bone of the folk that resistlessly stand.

The blood of old ploughmen runs hard in my arm,
Of axmen and yoemen and battlemen all,
Who fought and who flinched not by marish and wall,
Who met the bold day and chased ev'ry alarm;
My father- kind sleep, but I hear the old call,
And fight the hot battle by forge and by farm;

For these are my lands,
And these are my hands,
And I am bone of the folk that resistlessly stand.

THE U. T. FARMER

Vol. 7. JANUARY, 1913.

No. 4.

THE HIGH SCHOOL MOVEMENT.

HARRY CLARK, Professor of Second

Education.

Upon the train recently, I met a wealthy man from another State to whom I accidentally happened to say that the county through which the train was dashing did not have a high He expressed surprise that any county should be so unprogressive and was amazed to learn that fifty-two of our Tennessee counties were in the same condition. He said that the taxes which he paid with least hesitation were his school taxes. In a hotel lately, a big lumber operator from another State asked me why Tennessee put up with its illiteracy. I asked him what he knew about our heavy percentage of those that could not read and write. "Just this, that five out of every six men who sell logs at my mills have to sign their names with a cross," he replied. When I told him we could not expect better things until we got better educated teachers and told him how few high schools we had, he at first thought I was joking. Then he said: "Now I understand why Tennessee is poor."

These two testimonies from other States show the current thought outside Tennessee, not among the teachers but among the tax-payers. They consider high schools as necessary as elementary schools are.

Now, perhaps, good reader, you say, "Well the North can afford high schools because she is rich, but we are too poor in the South." I asked the State High School Inspectors of two Southern States last week how many counties in their States were without

high schools. "Eight," one replied. "Two," the other said, "and I think they are ashamed of being so backward and will put in high schools soon."

If Tennessee magistrates could realize how far behind our proud old State is, they would vote for high school levies because the vast majority of our magistrates are progressive and patriotic.

Whatever your attitude, good reader, with regard to high schools, the movement for establishing them is growing so fast that you cannot afford to ignore them any longer. As before said, other States have come to take them as a matter of course and are surprised that Tennessee does A recent bulletin from Commissioner Claxton shows that there are 1,100,000 pupils in public high schools and 150,000 in private preparatory schools. Although there has been such a remarkable growth that the number of high schools and the number of high school pupils have doubled since 1900, the movement is so rapid that the development in the last two or three years is greater than in the ten years before. Taxpayers are coming to see their value so fully, that some cities have erected million dollar buildings that dwarf some of Tennessee's good colleges in appearance. Is it any wonder that Dr. Claxton stated lately that he looked forward to the time when all boys would have at least a high school education? Some German states require it.

What is Tennessee's part in this movement? Although we commenced so late, compared with other States, our growth has been rapid, thanks to Dr. Claxton's remarkable work in Tennessee, reinforced by the constant efforts of Inspector Harned, three State normal presidents, and others. There was not a county high school in Tennessee until twelve years Lake County started in 1900; Roane and McMinn, in 1903; Anderson, in 1904; eleven counties, in 1906; three, in 1907; four, in 1908; eleven, in 1909; eight, in 1910; two, in 1911: three, in 1912. Two-thirds of the East Tennessee counties, nearly one-half the West Tennessee counties, about one-fourth the Middle Tennessee counties now have high schools. Where is your county in this movement, good reader? Is it keeping pace with this movement or is it a laggard?

In the face of this great movement, what arguments can be put up why your county should not have a high school? One man says: "If my county locates a high school in any one town, it will just be taxing the whole county for that one town, and that is not fair." In answer to this, please consult page 128 of Superintendent Brister's report for 1911, and you will find that there are one thousand (1141) more pupils coming from the country districts to the high schools than from the towns in which these high schools are located.

A second man says: "My county is too poor to afford a high school." The first answer to this is that Hancock County, with the second lowest assessment in the State, is running a good high school. Unless you are from Pickett County, this answers your objection. We hope to see the day when we shall have an equalization fund for high schools in counties as poor as Pickett and Hancock. second answer is that if your county does not maintain good schools, it will soon be poorer, because people will move away to counties with good public schools in order to give their children a good education. The six counties in Tennessee that have levied the least for schools in the last ten years are these in the following order: Cocke, Giles, Trousdale, Haywood, Williamson, Maury. Four have lost population heavily; two have just barely held their own. The seven counties levying most for schools are these in the following order: Marion, Scott. Grundy, Coffee, Hamilton, Unicoi, Washington. They have all gained in population. Thirty-seven counties in Tennessee lost population in the last decade. Over three-fourths of them (75.7 per cent) are counties levying twenty-five cents or less for schools.

A third man says: "No pyramid can be built from the top. I believe in beginning at the bottom with the elementary schools. Let's improve them before we start a high school." My friend, there is one pyramid that does build from the top. It is a volcano, and the red hot lava that pours out of its mouth builds the crater higher and broadens the base. so does a good high school build up both itself and the rural schools, for its graduates go out with inspiration and stronger scholarship to teach in the elementary schools. That has been the history of every county with high schools.

ment in the State, is running a good A fourth man says: "Why spend high school. Unless you are from one-eighth to one-fifth of our money Pickett County, this answers your on a school to which so very few of objection. We hope to see the day our pupils go? Why not spend it all

on the elementary schools?" But do so few pupils go to the high school? In the whole nation, one-fourth of the pupils entering the first grade continue on into the high school; according to Dr. Claxton's latest bulletin, 22 per cent. of all school children even if we include the negroes. The great growth of our high school enrollment indicates that in a few years Tennessee will reach this proportion.

So if you want good elementary schools, if you want the country child

to have his rights, if you want your county to grow in wealth, give us in every Tennessee county one good, strong, four year high school, giving practical courses in home economics and agriculture, employing teachers with college degrees and ripe scholarship. The result will be better teachers, more modern courses of study in our elementary schools, and country schools that will be suited to country life.

A TRIP TO THE INTERNATIONAL LIVE STOCK SHOW.

By F. S. HARKLEROAD, '14.

From past records, this fall is the second time that the University of Tennessee, has been represented at the International Live Stock Show. About six years ago Mr. D. C. Parman and another student, comprising a committee of two, were the first to represent the University at the International Stock Show.

By the good work of Mr. D. C. Parman, who boosted the trip and who gave a free ticket to one student, the trip was talked up and this time ten students accompanied by one professor made the trip to Chicago.

While this number of students may be small on account of the long journey to be taken, it is equal to that of other Southern institutions and it is hoped that it will grow larger and larger each year.

The colleges representing the South and numbers of students from each institution are as follows: North Carolina, 10; Georgia, 9; Texas, 6; Kentucky, 14; Arkansas, 8, and Tennessee, 10.

The students representing the University of Tennessee were: J. L. Hinshaw, J. E. Ring, C. M. Hume, J. S.

Garrett, R. W. Moore, R. H. Bell, F. S. Harkleroad, P. S. Cecil, H. J. Orr, J. W. Ridley and Prof. C. A. Willson.

As soon as the students had made up their minds to go the trip was mapped out and scheduled so as no time would be lost. The plans were carried out nicely and the trip proved a great success.

The delegation arrived in Chicago Monday, December 2, 1912, ate breakfast, engaged rooms at the new Southern Hotel and arrived at the Exposition grounds at 10:00 a. m.

The International authorities, upon learning of the arrival of our delegation, were so pleased that complimentary passes were issued to each member, admitting him to all shows on the grounds for the entire week.

The program for Monday was the judging of pure bred Belgian draft horses, pure bred and grade steers, college and Experiment Station stock and barrows.

In the afternoon our committee made a general visit to all parts of the show, particularly the sheep ring. and made a close study of the different breeds of sheep. From here they set out for the swine ring and were just in time to see the judging of the grand champion barrow classes.

All breeds of swine were well represented and the competition was keen, the final decision was awarded the Poland China, with the Berkshire a close second.

The Grand Champion for the pen of three was also awarded the Poland China with the Berkshire a close second.

The feature of the day's program was, while the judging of the live stock was being carried on in the arena, college yells given by representatives from different colleges Our delegation, from a patriotic State, was loyal to its institution, and joined in giving a big U. T. yell. When one delegation would finish its yell they would be applauded by the rest.

After supper our party attended the night horse show, consisting of the parade of 124 pure bred draft horses and 122 pure bred beef eattle and the expert driving of the Armour and Swift six horse teams.

The first event of Monday was the losing of two of our party. On arriving in Chicago in the Big Four Depot we ate breakfast and set out to find a hotel. When we had gotten several blocks from the station some one ealled our attention to the missing of two of our party. Our delegation was brought to a halt and the matter was discussed. Finally "Boney" Bell was sent back to search for the missing two. He played the hero by finding them wandering down a business street looking at the high buildings.

Tuesday morning our party planned to go up town and visit one of the large department stores. The one selected was "The Fair." This is a large twenty story building and had a large collection of wild animals exhibited on the sixth floor. The pretty girls and wild animals attracted one of our members so much that he wandered behind and was lost. He finally found his way to the elevator and showed up at the Exposition Grounds.

We returned to the show grounds in time to see the judging of the Grand Champion steer. The Aberdeen Angus captured both first and second prizes. Glencarnoek Vietor, grade Angus, took Grand Champion, while Blackrock 2d, was awarded reserved Champion. The Grand Champion's flesh was more mellow than that of the reserve and he also had a smoother finish. Not a wrinkle or surplus piece of skin was to be seen.

The program for Tuesday afternoon was the judging of Percheron draft horses, Hereford and Galloway eattle. There were 649 entries.

Tuesday night our party took a trip to the Land Show. Here we saw soil exhibits from almost every State in the union, along with other interesting features.

On entering the Land Show paid fifty cents for a ticket which eutitled the holder a coupon. If the coupon was taken to a certain place inside he could draw some article. All the fellows threw their coupons away with the exception of two. One fellow had his redeemed and drew a large box of eating apples. The other fellow not noticing the value of his coupon placed it in his plocket and returned to the hotel where the rest of the committee awaited him. On hearing the story of the other low's good luck he started back to the Land Show to have his coupon

deemed. He had to pay a second admission and received a second coupon. He had them redeemed and received a gill of corn syrup and a small loaf of bread.

Wednesday morning was spent visiting the large packing houses of Armour and Swift companies.

We were very much interested in watching skilled workmen and the modern machinery through which they turn out so much work. The daily dressing capacity of Swift and Company is 2,500 cattle, 7,000 hogs, 7,000 sheep and 1,000,000 pounds of lard. It takes them 35 minutes to dress a steer and 20 minutes to dress a hog. They take great pleasure in showing all visitors through their plant.

Wednesday's program was the judging of pure bred Clydesdale draft horses, Aberdeen Angus, Hereford and Shorthorn breeding classes. In

the judging of the Clydesdale no whip was allowed in the ring.

Wednesday afternoon we visited the stock yard and saw the Grand Champion carload lots of steers and swine.

Hall's Champion Aberdeen Angus Yearlings took Grand Champion in the carload lots of steers. While the Berkshires took Grand Champion and Reserve Champion in the swine carload lots.

The feature of the day was while visiting the exhibits at the stock pens we had the pleasure of seeing two graded Shorthorn steers that weighed 7,683 lbs., while one stood six feet high in the hind quarters.

Each fellow was more than pleased with his trip, but after the strenuous days spent at the stock show and the long journey on the train, we were glad to place our feet once more on the soil of dear old Tennessee.

INFLUENCE OF SHELTER ON FATTENING CATTLE.

By J. R. TITSWORTH, '13.

It is generally assumed that animals exposed to cold are forced to use a considerable portion of their ration to maintain their normal temperature. Upon this theory it has been assumed that the expense of fattening cattle in winter could be materially reduced by providing a warm shelter.

Calorimeter tests backed up by actual feeding trials by several Experiment Stations and also many practical feeders have given results quite contrary to this opinion. By calorimeter tests at the Pennsylvania Station it was shown that cattle on a light grain ration produced much more heat energy than is needed for the maintenance of their normal temperature and still more when on a heavy grain ration.

Relative to this question the Missouri Station has conducted four feeding trials during the winters of 1897-98 through 1900-'01. In these trials the cattle were on full feed of the same rations and were divided into three lots of five head each. One lot was fed in a comfortable barn with the run of a good sized room and on pretty days were allowed the run of an open lot from nine o'clock in the morning till four in the afternoon. In stormy weather they were turned out only long enough to get water.

Lot 2 was fed in a shed open to the South with the run of an open lot but were never confined.

Lot 3 was fed in an open lot with no protection whatever.

The following table briefly summarizes the results of the four year experiment:

	Barn	Op'n Shed	Open Lot
Corn eaten, bushels	158	168	170
Hay eaten, lbs	3471	3395	3937
Gain per lot, lbs	803	907	932
Daily gain per steer, lbs	1.78	1.99	2.05
Gain per bu, corn fed, lbs	5.08	5.40	5.48
Digestible matter per lb. gain	10.77	10.25	10,22

In every trial the open lot cattle consumed more food, made greater gains per day, and more economical gains except one. On the other hand the cattle fed in the barn, ate less food, made smaller gains per day, and least profitable gains with the exception of one trial which was the same winter in which the open lot fed cattle failed to make the more economical gains. Curiously enough this would have been considered the most favorable of any of the winters for out door feeding, since the weather was not severe, and was comparatively steady, dry and free from rain and snow storms. It was the year in which one would naturally except the farm to show to least advantage, but it was the only one in the four that it produced the cheapest gains.

The Pennsylvania Station has conducted experiments along the same line for seven winters except they used only two lots: one barn fed, the other the open shed with a paddock in which the steers run at will. In every case the open shed lot made the most economical gains.

In the winter of 1909-'10 the Pennsylvania Station conducted an ex-

periment to test the need of shelter for fattening cattle on a part silage ration. The cattle were divided into two lots of six head each. Each lot was fed a full ration of grain and silage, one lot was fed in a comfortable barn while the other was fed in an open shed as in the above trials.

The results in this experiment show that the silage fed steers fed in the open shed made more rapid gains at a saving of \$1.02 per 100 lbs. in production. The profit per head in open shed feeding was \$14.67, for bran fed steers it was \$10.69, or in other words an increase of 11.6 cents per bushel in value of corn fed the open shed steers over the barn fed.

Along this same line the Standard Cattle Company which has had fourteen consecutive winters experience in cattle feeding and has fed practically 70,000 head, report that cattle carrying some flesh and on full feed derive positively no benefits from protection of cold but are in some cases injured by the protection.

From the results of the above experiment we might draw the conclusion that profits in cattle feeding vary in inverse ratio to the amount of shelter used. At any rate the only shelter needed for feeding cattle in Tennessee is that which will protect them from storms and furnish a dry place for the animal to lie down.

ANTI-HOG CHOLERA SERUM

By M. JACOB, V. M. D., Veterinarian Tennessee Experiment Station

One of the greatest economic questions involving the live stock interests of the various states at the

present time is hog cholera. The annual loss occasioned by the ravages of this dreaded disease are enor-

mous, amounting to many millions of dollars. Tennessee, which is not by any means the most deeply afflicted state in the union, has an annual loss varying from one to two and possibly three million dollars. The disastrous effect to an individual herd when hog cholera appears is only too well known and many fond expectations, with the proceeds of a season's feeding or breeding process, have been completely destroyed. All of which makes the question of its control one of vital importance. Of course the absolute eradication of hog cholera from this or any other state in the union is, for the present, out of the question, but this is no argument why hog cholera should not be controlled in a given community or on an individual farm.

A true realization of its importance has prompted the United States Government, through its experts, to spend thousands of dollars and many years of research work in order to establish definite and valuable facts with reference to hog cholera. It finally remained for Dr. M. Dorset, Chief of the Biochemic Division, of the United States Bureau of Animal Industry, a Tennessean and former student of our State University, with his able assistants, especially Dr. W. B. Niles, to demonstrate to the world that hogs could be successfully immunized against cholera. Since then the United States Department of Agriculture has made an effort to induce the various State Agricultural Schools and Experiment Stations to obtain appropriations for the production of anti-hog cholera serum. It was felt, that by these means the hog raiser in a state might

have the benefit of a potent serum at a reasonable price.

Many states have already taken up this work and while it is true that some obstacles have been encountered, yet on a whole, the results in the production and use of state serum have been eminently satisfactory.

Available funds in the Tennessce College of Agriculture and State Experiment Station, for experimental work, along these lines have been very limited, yet they have been sufficient to prove to our own satisfaction that hogs can be made absolutely immune against genuine hog cholera. Furthermore, it is now an established fact that the only positive means of controlling hog cholera is by the intelligent use of the serum.

The various so-called "Cholera Specifics" to be administered internally are absolutely unreliable, and the annual waste by the farmers of the state in the purchase of such remedies is sufficient to establish at least six well equipped antihog cholera serum plants.

Hog raising represents a major part of our live stock industry, with wonderful opportunities in the future, provided we can hold at bay that only obstacle, hog-cholera. Is it, therefore, not an opportune time for Tennessee to do something definite for the protection of the farmer's interests and those of the consuming public, against this terrible food destroyer? Any argument to the contrary is ridiculous as well as unpatriotic.

INFLUENCE OF BREED AND TYPE UPON GAIN.

By J. R. TITSWORTH, '13

Practical experience has shown that there is a distinct advantage from a financial point of view, in using cattle of a definite beef type for meat production. Many different opinions have been advanced in the attempt to give the real reasons for this. One reason most frequently given is that the animal of beef type has a larger digestive capacity than the others. This does not mcan that he actually consumes more feed but that a larger percentage of what is consumed is assimilated.

The Pennsylvania Experiment Station carried on an experiment during 1905-6-7 to determine the efficiency of types of animals to convert waste energy into forms available for human food. For the experiment a pure-bred Angus steer and a scrub steer containing some Jersey blood were used. The steers received exactly the same rations and the same treatment. They were weighed and measured at regular intervals. The food was all analyzed, and frequent tests were made with the respiratory calorimeter.

The first determination made was the average digestibility of each type. The comparison was based on the percentage of total dry matter, the total energy and the protein content. Timothy hay was used as the roughage while mixed grains were used as the concentrates. In both instances the differences were so small as to be almost negligible.

Experiments were then conducted to determine the amount of the food assimilated or the available energy. This would be the difference between the total energy and the energy of the un-digested matter given off in the feces. This also was so small that it can be said that the available energy is the same.

Work was then done to determine the net energy. The net energy is the difference between the available energy and that rquired for the process of digestion. In this test the pure-bred steer seemed to be slightly superior to the scrub. The difference was greater during the early part of the experiment however. This has been explained by the fact that the measurements show that the scrub steer grew in length and height while the pure-bred increased in body and girth, or the difference in the kind of gain might account for it.

The next thing that was found in this experiment was the amount of food required to maintain the animal. It was found that the scrub required 33.7 per cent more food to maintain it than did the beef animal. The difference in temperament will go far to explain the superiority of the beef animal. The Angus had the quiet, almost sluggish temperament characteristic of the beef breeds in general while the scrub was more active and nervous, showing something of the disposition of the dairy type.

Computations were then made to show the amount of energy used in producing one unit of gain. It was found that the Angus was far better than the scrub. It was also found that the unit of gain in the Angus represented the storage of more energy than did the unit of gain in the scrub. The scrub gain was found to be largely protein containing a high per cent. of water while the Angus

gains were largely fat. This was later verified by a chemical analysis of the carcasses.

From what has been said we see that the economy of gain depends upon two things, viz.: the difference in maintenance and the character of the gain. Observation has shown that the difference between breeds is not so great as is the difference between individuals of the same breed.

The West Tennessee Experiment Station has been carrying on a feeding experiment since 1910 to determine the difference between breed and type in meat production. The animals were all given the same kind of rations and the same treatment.

The results for the winter 1911-12, were as follows:

Breed	No. of Steers	Average
		Gain
Beef	95	117
Scrubs	21	107

Each steer was also described according to feeder type regardless of breed characteristics. The following classifications of feeder type were made, viz.: poor, medium, good and very good. If a steer possessed heavy quarters, a broad back, deep heart and digestive capacity and had good quality, it was described as very good, good, medium or poor, according as, in the estimation of the judges, it would grade. In this classification, breed characteristics

were ignored as far as possible. The following results were obtained:

•	No.	Gain	Avge
Type	Steers	90 days	Gain
Very good	17	2948	173.8
Good	37	5751	155.7
Med. or Poor	26	3603	138.6
Steers of ver	v good	feeder	type

Steers of very good feeder type made 18.1 lbs. more gain than the next grade lower and 33.2 lbs. more than steers medium to poor in type.

The results for the winter 1911-12 were as follows:

\mathbf{Type}	No. Steers	Avg. Gain
Very good	. 7	144
Good	. 28	139
Medium	53	110
Poor	2 8	101

When classified according to both breed and type it was found that beef bred steers of the poorest type made an average gain of 11.1 lbs. more than the best type of scrubs. The poorest type of beef bred steers made 53.0 pounds more gain than the poorest type of the scrubs.

It is clearly evident then that one should not improve his animals by grading up with beef breeds where beef production prevails but one should, according to the above data, secure the best type of bulls of the beef breeds for improvement. The best gains are made by steers possessing the largest percentage of breeding of beef breeds and that are also of the best type.

THE EFFECT OF MASS SELECTION ON BREEDING.

By H. P. OGDEN, '13

Mass selection is that method of selection practiced by most animal breeders and also by many plant breeders. To illustrate, suppose a man goes through his corn field and

selects a bushel of the best ears he can find growing on the best stalks and uses that bushel of corn for his next year's seed. The following year he repeats this practice and continues to do so from year to year. The truck grower saves seed from his finest tomatoes or best watermelons, and the animal breeder selects high producing individuals for breeders.

Experiments have been made to test the truth of the assumption that the mating of the highest producing "pure bred" individuals will result in a superior producing offspring. Dr. Pearl, of the Maine Experiment Station, has carried on mass selection experiments with poultry for several years.

flock into He divided his groups. In one flock he put daughters of hens that produced 200 eggs or more in their pullet year, and in the second flock he put daughters of hens producing between 150 and 200 eggs. Each flock was headed by the son a 200 egg hen. He kept records on each hen by means of trap nests and found that there was continuous improvement in the average production of the flock and again there were no more high producing hens from the 200 egg mothers than from the poorer flock. His egg records show the following yearly products:

1899-1900—136.4 eggs. 1900-1901—143.4 eggs. 1901-1902—155.6 eggs. 1902-1903—159.2 eggs. 1903-1904—129.1 eggs. 1904-1905—134.1 eggs. 1905-1906—154.1 eggs. 1906-1907—142.8 eggs.

From his experiment, extending over almost 15 years, he draws the following conclusions: 1st. Mass selection does not result in a steady, continuous improvement in the average of the flock; 2nd, that the egg record of an individual gives no indication

as to what will be the probable record of her daughters, and 3rd, that a flock no matter how "pure bred" it may be, is not a homogeneous unitary aggregation, but is made up of several strains, some representing good producers and others not. In short, mass selection in this case was a failure.

Johannson tried to develop a strain of large beans and one of small beans by mass selection within a single so-called pure variety. He selected large beans and plants in one patch and small ones in another, but found that the size of the individual bean planted did not determine the average size of its offspring. Some of the large beans produced small offspring and some of the small beans produced large offspring.

He concludes that each "pure" commercial variety is made up of varying strains, each breeding true when propagated in isolation, and also that when mass selection does result in any gain it is because the breeder happened to hit on a certain pure strain and gradually eliminated all others.

Jennings attempted to develop two varieties of paramecian by mass selection but failed, though he carried on his experiment through a great many generations. All carefully conducted experiments on mass selection have given negative results. Yet most of the breeders are attempting to improve their animals by this method.

A great deal of attention is being given to the question of the inheritance of milk-producing qualities in cows. Dr. Pearl has classified the 3,070 cows admitted to the Advanced Registry (A. R. O.) during the year ending May 15, 1910, as follows:

Breeding of 3,070 Holstein-Friesian cows in the Advanced Register.

Description of Parentage	No. of A. R. O. Cows resulting from Stated Parentage	% Each Form of Parentage bears to total
Both sire and dam	ı in	
Register	1196	39
Neither sire nor d	lam	
in Register	710	23
Sire in Register, d	.am	
not	770	25
Dam in Register,	sire	
not	394	13
Total		

Cows are admitted to the Registry upon their own individual producing capacity, while bulls are admitted upon the record for production of the daughters. A bull must, therefore, be able to transmit producing capacity. This fact accounts for the increased percentage among those with just sire in Register above those just dam.

The breeder who selects cows or bulls from the Advanced Registry is practicing mass selection. The fact that a certain individual is an A. R. O. animal is proof positive to him that he or she will produce high grade individuals but according to the above table only 39 per cent of the

cows admitted to the Advanced Registry have both parents in the Registry. He follows the old adage that "like produces like." This is true. like does produce like, but the trouble is the breeder cannot judge the character of an individual by his appearances. Environment or a certain combination of forces may produce an individual that is apparently very good while he has not inherited the ability to transmit his excellence. As long as this is true we will always have A. R. O. Cows produced from mediocre dams or, what is more serious, we may have mediocre cows produced from A. R. O. cows.

It is the business of the breeder to separate the high producing lines from the low producing lines. Of course it stands to reason that high producing lines will tend to be collected in the Advanced Registry and the low lines excluded, but if Dr. Pearl's experiments with poultry mean anything, we can never expect by presnet methods of mass selection to get all the good lines of selection in the Advanced Registry or have all the poor lines excluded.

CERTIFIED MILKBy LEE R. STANDIFER, '15.

Certified milk is milk produced under strictly sanitary conditions as required by the Medical Milk Commissions which usually employ a veterinarian, a bacteriologist and a chemist to look after the production of the milk.

The following are some of the conditions that certified milk must conform to, viz.: 1 Certified milk must be free from pathogenetic bacteria. 2 It must not contain any preservatives or be watered or skimmed. 3 It must contain from 3 1-2 to 4 1-2

per cent. of butter fat, according to the requirements of the respective cities. 4 It must not contains more than 30,000 bacteria per c. c. 5 It must not be pasteurized. If the above conditions are complied with the commission grants the Dairyman a certificate allowing him to label and to sell the milk from his herd as certified milk.

Certified milk is at present used principally for infants and invalids. But this condition of affairs will not last long, in fact, many of the better informed people of today are beginning to realize the danger to which they subject themselves of contracting diseases every time they use any of the common market milk, and now many are using certified milk entirely. This kind of milk, as all know, saves the lives of infants yearly, also the health of many older people, and is a God-send to the invalid.

"The demand for certified milk," says the Assistant Chief of the Dairy Division, Clarence B. Lane, "is more than doubling every year, and the demand for it will continue to increase as the people learn of the difference between the common market milk and certified milk." The difference in the cost is more than equalled by the assurance given the consumer that he will not be in danger of contracting diseases.

The production of certified milk necessarily costs a little more per quart than ordinary milk produced in the usual manner. This is due to certain conditions which must be complied with in the process of production for which the producer is fully repaid by the increase in price which he can obtain for his milk.

The most important point in the production of certified milk is the health of the cow. She must have no disease, as tuberculosis for instance. In order to be certain as to the presence or absence of tuberculosis, the tuberculin test must be applied at least once a year by a competent veterinarian. If she reacts in the slightest degree, she must at least be immediately removed from the herd and her milk discarded. The condition of the dairy barn should be sanitary in the fullest meaning of the word. precautions should be observed

keep undesirable odors and bacteria out of the milk. The cows themselves must necessarily be kept clean and the clothes of the milker should be changed daily. The milking utensils should be few and simple in construction. They should be washed and sterilized after each milking and allowed to stand in the sun during the day. The method of milking itself should be of the cleanest, the cow curried, flank and udder dampened, the bedding moistened and no dust prevailing while the milking is going on. Neither must we forget the value of milking with dry hands and closed pails.

Even if we carried out the above regulations to the letter, it would profit us nothing if we stopped here in our ideal methods of producing milk. But we must now, as soon as the milk is milked, quickly place it in the cooler and cool it to a temperature of 45 degrees Fah. If sold in bottles these must be sterilized and the filled bottles kept on ice until delivered.

At the present time there are many dairymen producing certified milk who are making a good profit on it. They say that where customers who know something about milk can be found that it is an easy matter to get from three to five cents more per quart for their milk than for the ordinary market milk. It is true it costs on an average of from one to two cents more per quart to produce the certified milk but deducting this from the selling price there is still left a margin of from one to three cents per quart. Thus you see that it is, besides being a God-send to humanity at large, a paying proposition which should attract every man's attention.

THE INFLUENCE OF FOOD ON SKELETAL GROWTH

By JEHU L. HINSHAW, '13

In order that the young animal may develop into a large, mature one, it is necessary for it to have a supply of bone making material. The bones are made up almost entirely of ash, so in order that the animal may have a rapid bone development there must be plenty of ash in the food. food of animals that mature the fastest should be especially well supplied with this bone material. Nature provided for this in that the milk from such animals is richest in the ash constituents. But the feeder cannot depend on the mother to furnish all the minerals needed.

The mother should be fed food rich in ash while the foetus is being developed. The young, unborn animal will receive the full amount of nourishment no matter if the mother is slighted, but it will do so at the expense of the mother. The lack will be supplied from the tissues and bones of her body. Therefore it is very important that the dam be well supplied with the best food.

The symptoms shown by animals deprived of ash constituents of food are: loss of appetite, general weakness, staggering gait, muscular tremors, great irritability, and convulsions, followed by death. Malnutrition of the bones is one of the most common results from lack of minerals. If the deficiency of minerals is not marked but is long continued, then the result is lack of development of size.

Throughout the corn belt where corn makes up the ration almost entirely, it is not at all common to find under sized stock. This is especially true of pigs. They are fat but under sized with very fine bones. This

is due to the lack of a properly balanced ration in ash content. The Ohio Bulletin, No. 213, gives the results of some experiments with certain kinds of feeds fed to hogs, the effect on the bone being noted. The following table shows the results:

RATION	Volume of Humerus C. C.	Ash in Humerus Gram	Ash per C.C. Gram	Length Humerus C. M.	Breuking Strength Lbs.
Corn		32.92	.3048	13.88	509
and bran extract Hominy: blood flou	111.8	33 33	.2981	13.68	575
and lecithin Hominy: blood flou	118.0	38.97	.3303	13.70	736
and bone meal	121.0	46.22	.3811	14.00	791
and sodium phospi		35.59	.3164	13.90	624

The bones of the hogs fed bone meal were the largest, contained more ash per volume and per c.c. and were the strongest. The bones of the corn fed hogs were the smallest and weakest of any. Corn is a good feed if supplemented by a food rich in protein. I say protein because this material always carries a large amount of ash.

Many feeders think that they must have grass and exercise before the animals will grow well. Grass is a very important feed but the grass may be low in the mineral elements especially during a dry spell. The mineral elements may be supplied by keeping the soil well supplied with lime and phosphorus and potash. Crops like alfalfa clovers and soy beans require soils rich in lime, phosphorus, and potash; and are themselves rich in these elements, therefore, they make good supplements to go with corn feeds.

If the animal does not seem to get enough ash in the feed it may be supplied by feeding tricalcium phosphate or a little air slaked lime added to the feed is also good. I know one hog breeder that keeps a pile of air slaked lime where all of his pigs can get to it when they want it. One can often see the old sow and her pigs rooting around this lime.

Remember that if animals are to mature rapidly that they must have plenty of mineral nutrients, and that these minerals must come through the food. The stock man must know what foods are rich in these needed elements in order to feed his stock in a profitable way. It is not economy to feed a pig a corn ration just because corn is cheaper than some other food. Make the ration largely of corn if you like but be sure to supplement it with a food like bone meal or soy beans or if no other way supplement it with tricalcium phosphate.

LAND DRAINAGE

By F. R. HINES, Special

Of all the conditions influencing the growth of crops none is more important than water, which in a thin layer about the soil particles is essential to plant growth; but an excess of this is detrimental, as a rule. The removal of this excess by land drainage is the subject which is now to be discussed. Two types of drainage are to be considered; surface and underground. The drainage deals only with the run off while underground deals with the water which fills the air space of the soil.

The reasons for drainage are many, and some of the most important should be mentioned: Too much water in the soil hinders cultivation, makes cropping late in the spring, makes land cold, crowds out the useful bacteria and prevents crop growth where it stands.

When water is seen standing on the surface it is a good indication that more water is supplied to the soil than can be removed. Drainage conditions can be improved by stopping the entrance of water or by removing it from the land by open surface ditches or underground drainage. The improvement of drainage consists in protection ditches to prevent water from running into the area, in outlet ditches to draw off the surplus water, in surface ditches to remove or aid in removing surface water, and in covered underdrains to remove water from the wet subsoils.

The fact that the area of land drainage is so rapidly increasing proves that the benefits to be derived are great. One case is on record of a field that was too wet for good pasture. It was tiled and the next spring it was ploughed before some of the upland on the same farm was dry enough. Another case is of a muck field that before drainage was so wet that corn could not be worked. After drainage the corn grew one foot taller than that on the upland and had a much better color. On the same land barley and oats were increased 11 and 16.2 respectively, per acre over upland that was supposed to be perfectly drained.

Surface ditches are constructed to remove surface water, and but little underground water, so they need not have but a small depression. A surface ditch 1 foot deep at its head, 3 at its mouth, and one-half mile long with a fall of two feet will remove flood water faster than it can escape over the surface with a much greater fall. Surface ditches should be constructed in V shape, that is, should

be rounded in bottom with banks sloping, and the bottom should be near one-half the width of the top.

Sub-surface drainage consists generally of tile land from two and one-half to three and one-half feet deep, and more shallow in clay than in other soils. Tile lain deep seems to be more efficient than shallow ones. Tiles four inches in diameter lain from forty to eighty feet apart are best, so that if

not sufficient another row can be placed between.

Taking all things into consideration on most farms tile drainage is cheaper than sub-surface. First, because there is no waste land, no weeds and there is no harbor for injurious insects. Second, there are no ditches to interfere with cultivation. Third, good tile is almost permanent, while surface ditches are to be cleaned each year.

FARMERS' WEEK JANUARY 6-11.

One Thousand Farmers Wanted—Many Prominent Men to Lecture— Low Rates on All Railroads.

For over sixteen years the University of Tennessee has been giving an annual short course, in connection with the College of Agriculture, especially for the farmers and farmers' wives who could not attend the regular course in agriculture. This course heretofore has begun about January 1st, and continued eight weeks with a fair number enrolled, and, from these, have developed some of our most prosperous farmers.

This year the College of Agriculture has inaugurated a new feature which promises to be a great drawing card for our coming short course. This is the Farmers' Week which is to be held January 6-11.

The College hopes to bring a thousand farmers here to spend one week together studying the problems of practical farming. The professors of the College of Agriculture and the Experiment Station will be aided by agricultural men from all over Tennessee and adjoining States. Prominent lecturers will be present, and will talk on subjects in which they are specialists. Breeders will be here to

exhibit their stock and successful men in every line of agriculture will help in solving the problems with their experience. Discussions will be given on a variety of subjects, but special attention will be given to live stock judging.

It is not hoped during this week that all will become thoroughly versed in scientific agriculture, but they wish to treat of practical things in a practical way. The theoretical side will be touched only enough to explain the practical. This is not strictly a school of teachers and pupils, but all are expected be students of practical culture, and it is hoped that this will be more a convention of earnest workers who will put their heads together and work out the solution of some of our practical farm problems.

The meeting is to be held in Oliver Perry Temple Hall, which is situated on the terraces on the Northern portion of the University Farm. This magnificent building was constructed, at the cost of \$12,000, solely by the East Tennessee Farmers, their main object being a convention hall for the

"East Tennessee Farmers' Convention." This building has recently been completed, has all modern appliances for steam heat, and will make an ideal place for such a meeting. There is an arena in the center which can be used for the exhibiting and judging of all kinds of live stock. Just back of this arena is a large stage 14 x 30 in size, and on the side of the arena opposite the stage are seats arranged in tiers, to give a good view of both stage and arena. The main auditorium will seat about 800 people, and the arena, which can be used for such purposes, when not showing live stock, will seat 400, and on each side of the building are balconies that can easily accommodate 300 people. Another excellent point about this building is its many windows and large skylight which supply ample light and ventilation.—Orange & White.

MONDAY, JANUARY 6TH.

- 1 P. M.—The University and its Relation to the Agriculture of the State—President Brown Ayres.
- 2 P. M.—The East Tennessee Farmers' Convention and the Short Course—W. B. Stokley, Dandridge, Tenn.
- 3 P. M.—The Work of the Agricultural Short Course Club—Phil. S. Taylor, Jonesboro, Tenn.
- 4 P. M.—Live Stock Demonstration—C. A. Willson.
- 5 P. M.—Statistical Study of Tennessee's Agriculture—H. A. Morgan. 7:30 P. M.—A Social Evening—

Agricultural Club of University.

TUESDAY, JANUARY 7TH.

8:30 A. M.—The Agricultural Cycle—H. A. Morgan.

9:25 A. M.—The State's Soils.—C. A. Mooers.

10:20 A. M.—The Work of the State Department of Agriculture—Capt. T. F. Peck.

11:15 A. M.—The Beef Breed of Cattle—C. A. Willson.

12:10 P. M.-Lunch.

1:15 P. M.—Draft Horses—Dr. M. Jacob.

2:10 P. M.—Seed Selection—J. C. Pridmore.

3:05 P. M.—Judging of Beef Cattle—C. A. Willson.

7:30 P. M.—The Country School—Supt. J. W. Bristow, Nashville, Tenn.

WEDNESDAY, JANUARY 8TH.

8:30 A. M.—Animals of the Farm—H. A. Morgan.

9:15 A. M. Soil Study—C. A. Mooers.

10:05 A. M.—Breeding and Management of Hogs—J. D. B. DeBow, Nashville, Tenn.

11:15 A. M.—Dairy Breeds of Cattle—C. A. Willson.

12:10—Lunch.

1:15 P. M.—Jacks and Mules—A.B. Harlan, Columbia, Tenn.

2:10 P. M.—Corn—J. C. Pridmore. 3:05 P M.—Live Stock Farm Management—C. A. Willson.

7:30 P. M.—Agriculture and Education—Dr. Tait Butler, Memphis, Tenn.

THURSDAY, JANUARY 9th.

8:30 A. M.—First Lessons in Feeding—H. A. Morgan.

9:25 A. M.—Soils and Fertilizers—C. A. Mooers.

10:20 A. M.—Beef Production—D. C. Combs, Lespedeza Farm, Hickory Valley, Tenn.

11:15 A. M.—Hog Pastures—Dr. Tait Butler,

12:10-Lunch.

1:15 P. M.—Light Horses—Dr. M. Jacob.

2:10 P. M.—Grain Judging—J. C. Pridmore.

3:30 P. M.—U. S. Department of Agriculture Farm Demonstration Work.—H. D. Tate, State Agent, Jackson, Tenn.

FRIDAY, JANUARY 10TH.

8:30 A. M.—Feeding Rations—H. A. Morgan.

9:25 A. M.—The Use of Lime on the Farm—W. H. McIntyre.

10:30 A. M.—Strawberry Growing—Mr. C. P. Coleman.

11:25 A. M.—Breeding and Feeding of Hogs—C. A. Willson.

12:10-Lunch.

1:15 P. M.—Farm Sanitation—Dr. M. Jacob.

Professor Moores will soon have a new bulletin in press on the subject of "Liming." He has collected a great amount of data from all parts of the State which he expects to use in making this a very popular as well as valuable bulletin on this most important topic.

2:10 P. M.—Experiences with Alfalfa—H. A. Morgan.

3:05 P. M. Rotations of Crops for Tennessee—C. A. Mooers.

4:00 P. M.—Hog Judging—C. A. Willson.

7:30 P. M.—Farm Engines—C. E. Ferris.

SATURDAY, JANUARY 11TH.

8:30 A. M.—Sheep and Their Management—C. A. Willson.

9:25 A. M.—A Study of Weeds— J. C. Pridmore.

10:15 A. M.—Hog Cholera Serum— Its Preparation and Use—Dr. M. Jacob.

11:05 A. M.—Grains and Grasses— C. A. Mooers.

12:00 Noon-Lunch.

1:15 P. M.—Excursion over the Experiment Station.

The new winter beardless barley which the Station is developing, looks fine this winter. Four years ago the cross was made between Tennessee Winter (bearded) and the Beardless Spring barley and from this cross a few plants have been selected that are proving to be hardy and beardless.

THE U. T. FARMER

Scientific; therefore practical

Published Monthly by the Agricultural Club of the University of Tennessee.

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DEPARTMENT EDITORS.

Judd Brooks, '12Alumni

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EDITORIAL.

H OW many of your neighbors are coming with you to Farmers' Week at the University? Everybody in the State is invited to come and to bring a sample of corn or small grain for exhibition. The entire program will be carried out at the Experiment farm in the barns, dairy, and the new pavilion.

ENNESSEE will soon be recognized as the Agricultural State of the South judging from the interest now evinced in Short Courses, Corn Clubs and other agricultural organizations. value of these institutions is not only in the actual facts regarding better farming methods which are taught, but lies as much in the enthusiasm, inspiration and opportunity for exehange of ideas which it provides. This inspiration extends to all students in the College of Agriculture and reflects itself in all the colleges of the University, making everybody glad to welcome the "Short Horns."

This general spirit is shown in the annual "Short Horn" reception, which will be given on the 6th of January. Perhaps there are those who fail to see how a Short Course reception helps to make Tennessee a great agricultural State. Well it is this way, it brings the farmer into closer touch with his professional brother of the city, and it also acquaints the city man with questions of rural life to the benefit of both. The reception while important in its way is not the whole show which is to learn something of "lime, legumes and live stock."

In reading articles on agricultural subjects we are often amused by the way so many start out, for instance: "One of the most important." The writer then goes on with his article. Well one of the most interesting features of Farmers's week will be livestock judging. There will be a good representation of types and breeds of live stock on exhibition. Dr. J. H.

Stanberry and son will have a very fine display of hogs. We are proud of the reputation for swine breeding that Dr. Stanberry has made for Tennessee. He is one of the most progressive and up-to-date breeders in the entire South. The following are some of his noted Durocs: Tennessee Colonel 20665, the king of Durocs; Lexington Chief 31155, the Grand Champion, Blue Grass Fair, 1911; Volunteer 32899, Grand Champion, International Live Stock Show, Chicago, 1911, and sold for \$1,000; Model Cherry 30439, Grand Champion, Tri-State Fair, Memphis, 1911; Red Chief 35939, Grand Champion, Tennessee State Fair, Nashville, 1911.

THE NATIONAL DAIRY SHOW.

THE dairy editor of the U. T. Farmer had the pleasure of attending the 7th Annual National Dairy Show, recently held in the International Amphitheatre, Chicago. show, coming as it does, just after the different State fairs, is the general round-up feature of the season, so far as dairy shows are concerned. Few dairymen who have never visited this show realize the immensity of the exhibits and the educational value of the show. Some idea of the nature and extent of the display may be had when you consider that the International Amphitheatre, covering practically a city block, was filled with exhibits of dairy cattle and dairy machinery, showing the best and latest developments in the field of dairy research. All the different breeds of dairy cattle were represented by an exhibit of nearly 800 head of prize winners from 17 different States. The exhibits in the dairy machinery department included a vast demonstration of modern labor-saving machines

for use in the production of sanitary milk. There were numerous educational exhibits, such as those of the Dairy Division, U. S. Department of Agriculture, The Chicago Board of Health, and others. The National Dairy Show is now recognized as one of the greatest dairy shows in the world, and dairymen will find that a visit to this show next fall will be not only pleasant and interesting, but also a very profitable expenditure of the necessary time and money.

CHORT Courses in Agriculture of a week's duration. each have been conducted by the University during the months of November and December in McMinnville. Columbia, Clarksville. Brunswick (Shelby County), Jackson, Paris, and Livingston. Professors Morgan and Keffer and Mr. Hardin were in constant attendance and were assisted by Dr. Jacob, Prof. Harry Clark, and Professor Mooers in several lectures. and by Mr. L. R. Neal, of the Southern Agriculturist, Dr. Tait Butler, of the Progressive Farmer, Professor Bright, of the West Tennessee Normal School, Mr. H. D. Tate and W. J. Dean, of the U.S. Demonstration Service, Mr. J. E. Converse, of the Middle Tennessee Co-operative force, and Messrs. MacLanders and J. A. Dinwiddie, poultry experts. A car of equipment, consisting of live stock, corn samples, charts, dairy and horticultural outfits, was taken along for demonstrations, adding greatly to the interest of the courses. The attendaance throughout was good, and the interest of the farmers proved beyond doubt the great value of University Extension Work in Agriculture. President Ayres has announced the purpose of the Board to ask large appropriations of the next legislature for work of this character.

The Short Course carries the University out to the people, giving them an opportunity to see and hear a little of what the regular students enjoy in such large measure. When the Short Course approves itself to the public, a fact attested by enthusiastic "Short Horns" wherever the course is offered, we may be very

sure that the full course is being given much thought, and that the Short Course will prove a most valuable means of increasing the attendance at the University. Even if this should not result, the practical good accomplished during these Short Courses is in itself more than sufficient warrant for holding them in every county in the State.

NEWS ITEMS

D. C. Parman, '11, showed his loyalty to the University by providing expenses of a student representative to the International Live Stock Show at Chicago.

The valuable colt, Fay, died on the 13th of December, at the age of two years. When 22 months old she had attained a weight of 1550 lbs.

Major's Faney Tormentress produced more butter than the printer would give her credit for. On page 81 of the November Farmer is the statement that she produced 300 pounds of butter fat in 16 1-2 months and it should have been in 6 1-2 months. In her 7th month she has made 53 pounds of butter fat.

On the 6th of December the faculty, alumni and students of the University enjoyed a banquet at the Stratford, given in honor of Prof. Chas. E. Ferris, head of the Department of Mechanical Engineering, through whose efforts we have succeeded in getting Courtney Hill for an athletic field. This was undoubt-

edly one of the most enjoyable events that has occurred for months. We need more occasions of this character where the entire student body, faculty, alumni and friends may meet in a common cause.

The corps of Short Course instructors has at last returned to Knoxville, tired but happy in the belief that this has been the greatest educational campaign conducted by the University.

The ear of live stock which visited the Short Course has also returned, but the reporter was unable to learn their feelings regarding the Short Courses.

The DeLaval has just sent us a very interesting little "Dairy Hand Book" containing articles regarding the various phases of dairy farming, written by the foremost agricultural workers of the United States. This booklet contains information useful to the general farmer and is sent out to those asking for it.

The tobacco growers around Clarksville have co-operated with the U. S. Department of Agriculture and the Tennessee Experiment Station for the purpose of establishing a co-operative and demonstrational tobacco farm at Clarksville. A 20 acre tract on the eastern edge of town has been secured where the rotations, fertilizer experiments and other features of tobacco farming will be conducted.

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When you begin to clean your dairy what do you do? Do you use a cleaning material corresponding to the pick and shovel or is it



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Wyandotte Dairyman's Cleaner and Cleanser, like the drill, does its

Wyandotte Dairyman's Cleaner and Cleanser, like the drill, does its work in a clean cut manner. Bits of dirt, old butterfat, refuse and stale matter are first loosened, brought to the surface and then easily rinsed away in the washwater without the slightest injury to the surface cleaned or to the users hands. Only the natural clean surface of the utensil remains, free from all odors, germs and bacteria.

The greatness of Wyandotte Dairyman's Cleaner and Cleanser lies in its power to clean everything in the dairy or factory sanitarily clean, with little work, and at a cost any dairyman can well afford.

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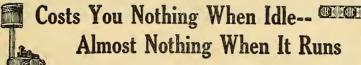


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Constructed of the best material; built by men who know what a good engine must do; thoroughly tested before leaving the factory; an I H C gasoline engine is strong, dependable and powerful—as perfect an

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power. Ask the IHC local dealer to show you an IHC engine and explain each part. And remember our responsibility does not end when the dealer makes a sale—the customer must be satisfied. If not convenient to see the local dealer, write for catalogue and full information.

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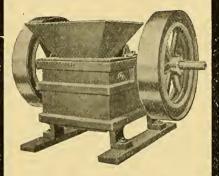
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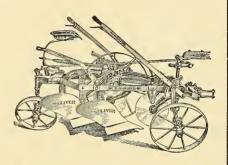


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Vol. VII.

FEBRUARY, 1913 Published Monthly by No. 5

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TENNESSEE

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The Wise Farmer

THERE WAS a man in our town
And he was wondrous wise
He Knew that if he wanted crops
He'd have to fertilize.

"It's nitrogen that makes things green"
Said this man of active brain;
"And potash makes the good strong straw,
And phosphate plumps the grain.
But it's clearly wrong to waste plant food
On a wet and soggy field;
I'll surely have to put in drains
If I'd increase the yield.

"And after I have drained the land
I must plow it deep all over;
And even then I'll not succeed
Unless it will grow clover.
Now acid soils will not produce
A clover sod that's prime;
So if I have a sour soil,
I'll have to put on lime.

"And after doing all these things,
To make success more sure,
I'll try my very best to keep
From wasting the manure.
So I'll drain, and lime, and cultivate,
With all that that implies;
And when I've done that thoroughly
I'll manure and fertilize."

College of Agriculture
Ohio State University

-VIVIAN

THE U. T. FARMER

Vol. 7. FEBRUARY, 1913.

No 5

PRODUCTION OF CLOVER SEED IN TENNESSEE.

By S. M. BAIN, Botanist Tennessee Agr. Exp. Station.

The State of Tennessee, twentyfive years ago, produced considerable quantities of clover seed for market. It seems that no definite statistics are on record relative to the amount of clover seed production at that time, but it is well known that much seed was produced, especially in Middle and East Tennessee. writer distinctly remembers that almost every farm of any size in the Central Basin then produced a crop of clover seed almost annually. During the latter part of the summer and well into the autumn clover hullers were yearly in active operation through much of that region. With the advent of the destructive anthracnose of clover, which subject has. within the last few years, received very careful and successful attention at the Tennessee Experiment Station, clover seed production has passed out almost entirely. A rather careful survey through the region indicated has revealed the fact that the clover hullers of twenty-five years ago have long been consigned to the rubbish heap.

With the successful solution of the clover problem in Tennessee there is no reason why the state should not again produce large quantities of clover seed for the market. Contrary to the general impression among farmers, it is true that home produced agricultural seed of any kind are almost always preferable to those produced in far distant regions. There are a number of reasons

for this, chief of which is that natural selection works almost always for the preservation of the individuals best fitted to the region where seed is produced. The writer has pointed out on a number of occasions that the clover crop of Tennessee would probably never have failed if only home grown seed had been constantly used.

One probable reason for the introduction of Northern grown clover seed into this region is that, generally speaking, the Northern grown seed are larger and more attractive in appearance. The size of seed is not always an indication as to their quality, though this is generally true. The writer has frequently observed that the finest individual clover plants, those of unquestionable quality, will bear a crop of quite small seed.

Of course the chief difficulty in the way of restoring clover seed production to our region is the destructive disease above referred to. After the general introduction of the resistant strain of clover distributed from this Station, natural selection will undoubtedly take care of the future of the crop, provided we continue to produce our own clover seed and keep it in this section where it is constantly exposed to the disease mentioned. One great enemy to clover seed production as well as to the clover crop generally, is the dodder or "love-vine." This vile pest has invaded almost every clover field

in Tennessee and great care must be exercised by growers who wish to produce clover seed free from it. There is no method thus far known of cleaning dodder seed out of clover seed after it has once been contaminated with it. The solution of this difficulty lies only in the hands of the growers themselves. It will be absolutely necessary to keep every vestige of the pest cleared out of fields during the growing season. Unless there is very extensive infection with dodder, a chance plant here and there may be removed with a hoe or other suitable implement, if taken in time. The only method of succeeding is to dig up entirely the clover plants that have been attacked by the pests and to remove the plants for a considerable radius around where the pest has gained foothold. It will then be necessary · to carry these infested plants entirely out of the field, or still better, to cover the whole mass with dirt in the center of this denuded area. After having cleared our fields of every trace of dodder, it is very important also to see to the thorough cleaning of the hulling machine, especially where this machine passes from one farm to another. It is a fact that one dodder seed may, under favorable conditions spread over nearly an acre of clover.

In addition to dodder there are several other weed seeds of considerable importance that may contaminate clover seed. The worst among these is perhaps the weed commonly known as "buck horn." Crab grass also is another troublesome pest, though as indicated below this may probably be avoided by saving the first crop of seed.

In the course of our experiments at the Station in the production of small quantities of clover seed used for breeding experiments, some right interesting facts have come to light. The production of clover seed depends very much on the character of the season. By far the best crop that we have had in the course of these experiments was harvested from the first crop instead of from the second. It is generally believed that bumblebees are necessary for the cross-fertilization of clover flowers and that the first crop of clover will contain very few seed on account of the scarcity of bumblebees that early in the year. Our experience here has not borne out this idea. In any case abundant bumblebees may be observed when the clover first blooms in the spring.

While the success of such a course can not be vouched for on so short a term of experience, yet it is the writer's opinion that the best method of producing clover seed in Tennessee is to sow the seed in August without a nurse crop on clean and well prepared land. This crop should make during any average season splendid growth before the advent of It is then ready to begin vigorous growth early in the spring and should be allowed grow up and produce seed at once, not waiting for the second crop. It is also likely that two good crops of seed might be harvested from the same ground during the one season.

In conclusion, it can not be too strongly urged that the producers of clover seed in Tennessee for the next few years deal very honestly with the resistant clover that will eventually reach them. The strain originating in Tennessee should create its own demand in a number of adjoining states, where unquestionably it will prove of as great value as in this state. There should thus be by honest dealing a demand created for Tennessee grown seed.

THE PLACE OF LEGUMES IN PERMANENT AGRICULTURE.

By L. P. GABBARD, '16.

The United States is an agricultural nation, and to this industry we are indebted for much of our progress in the last century. Heretofore. much of our farming has been and continues to be exploitive. It has been the practice to clear up the virgin soil, that needs only to be tickled with a hoe to make it smile back at us with an abundant harvest, and continue its cultivation until its fertility is exhausted. Such lands have been cultivated with an eye single to profit-making, and blind to a rational system of permanent agriculture. We have deluded ourselves with the idea that we have unbounded resources in land, in forests, and in mineral wealth. We have been prodigal in the utilization of these resources. We must now pay the penalty of this prodigality. In many communities the soil fertility has been reduced below the point of profitable production. We must cease abusing the soil. We must cease the renting of land on short leases for the purpose of growing grain for the market. More attention must be given to the raising of domestic animals, and to the maintaining of a rational system of crop rotation.

During the last sixty years we have brought into cultivation the largest and richest body of agricultural land in the world. While this land was new and rich the produc-

tion of abundant crops was accomplished at little expense and with little knowledge of the principles of the conservation of soil fertility. This period for exploitive farming is now past. Nation-wide effort is being made toward the restoration of soil fertility. Hence, the problem of every thoughtful farmer is how to conserve his fertile soil and how to restore his worn-out soil.

When we speak of worn-out soil we do not mean that the soil is poor in all of the ten elements of plant food absolutely necessary for plant growth, but lack one or two of the necessary elements. The farmer must know just what element or elements of plant food his soil lacks.

To do this let him observe a growing wheat crop. If the stalks are tall and the blades of a dark green color it indicates the presence of plenty of nitrogen in the soil, but if the stalks be short and the blades of a vellowish green color it shows the lack of nitrogen. If at the same time the tall rank stalks are not strong and fall down under the burden of their grain and the strain of the winds we conclude that the soil is lacking in potash. If the heads are not well developed and the grains are not solid and plump, it indicates the lack of phosphorus. Thus the farmer may decide for himself just what this soil needs and may supply

this needed element, instead of putting on a little of each as the fertilizer agent would have him do.

Most all of our soils are poor in nitrogen, despite the fact that over every acre of land there are over seventy-five million pounds of free nitrogen of the air. To make farming profitable we must get more of this inexhaustible supply into the soil.

We can add it with commercial fertilizer. Such is possible but costly. Many years of experience give testimony to the fact that the farmer cannot afford to buy commercial fertilizer for the raising of heavy grain crops.

A crop of corn requires about seventy pounds of nitrogen to the acre. Now the best complete fertilizers generally have about 2 pounds of nitrogen to every 100 lbs., of which about half is available for plant food. If we apply 300 lbs. per acre, which is more than the average farmer applies, we will have added only 3 lbs. of available nitrogen to the acre.

Fortunately nature has provided a cheaper and better means of replacing this lost or lacking nitrogen in the soil. by the growth of legumes. It has been known for a long time that leguminous plants in some way enrich the soil. To what this soilenriching function is due has not been understood till within the last thirty years. It is now a well known fact that legumes enrich the soil, by increasing the amount of nitrogen present.

We say that legumes, such as clover, alfalfa, peas, beans, etc., have the power to obtain nitrogen from the air. This is not strictly true. Within themselves, red clover or cowpeas

do not have the power to obtain nitrogen from the air, but there are certain microscopic organisms, which commonly live in the tubercles which have the power to take up this free atmospheric nitrogen and by its union with other elements form compounds suitable for plant food. The legume in turn uses this nitrogen in the growth of both the top and the roots.

As just stated the nitrogen-fixing bacteria live in the tubercles which grow upon the roots of the various legume plants and are readily seen. They vary in size from smaller than a pin head to larger than a pea, and in case of the velvet bean the tubercles have been known to grow as large as pigeon eggs. The tubercle is the home of the bacteria. These bacteria are far too small to be seen by the naked eye, but may be seen by the aid of a powerful microscope, several million inhabiting one of these tubercles.

In general there is one kind of bacteria for cowpeas, another for clover, and so on, for all the different legumes. There are noteworthy exceptions to this truth since certain strains of bacteria will live on different legumes. The bacteria of alfalfa will grow on the roots of sweet clover. Also there is evidence by a long process of breeding, or evolution, the bacteria which naturally grow on one kind of legume may develop power to grow on an entirely different one. If one could by breeding, or evolution, produce bacteria having the power to grow on non-leguminous plants, it would be of incalculable value. This seems impossible.

Not only does the legume furnish a home for the bacteria, but it also

furnishes, through its sap, most of ent day by chief authorities of the the nourishment for the bacteria. The bacteria on the other hand, takes nitrogen from the air contained in the pores of the soil, and combine the nitrogen with other elements so that it can be used as food by the legume.

Legumes may be grown to some degree of success in every section of the union. The wide distribution of legumes throughout the world indicates a remarkable adaptability to various climates and conditions. This is true of alfalfa. It is grown in Southern California below sea level and at altitudes exceeding 8,000 feet in Colorado.

In the growing of legumes the farmer must take into consideration the fact that not all soils are natural habitants of the nitrogen-gathering bacteria. Furthermore, that leguminous plants are not able to gather atmospheric nitrogen without these bacteria which may need to be artificially supplied to some soils. This process is called inoculation, and is accomplished by sprinkling the seed with artificial cultures of bacteria, or by scattering over the field soil from a field in which bacteria are known to exist.

Among annual legumes, cowpeas and soy beans are best known. The growing of either of these proves very profitable to the Southern farm-The latter especially, both because of its enormous power to gather nitrogen, and its value as a hay and feed plant. It is to the South what red clover is to the North, and alfalfa is to the West.

The hairy vetch is a hardy legume that thrives from the lakes to the gulf, and is looked to as the most promising winter legume of the presagricultural industry. To substantiate the credulity of such a belief and claim for the hairy vetch, and to add to its practical and not its theoretical value I shall give a somewhat detailed statement of the experiments worked out under the supervision of Mr. S. L. Clark, on the college farm at Berea, Kentucky.

Mr. Clark's predecessors cultivated a field of 12 acres two years, each time resulting in a loss of seed and labor put on the field. The third vear on this same field there was applied 4,800 lbs. of high grade fertilizer costing \$5.60 per acre. It was then seeded to cowpeas. For all the labor and expense of this crop there was the small return of about 800 or 1000 pounds of hay. The entire field was then hopelessly abandoned.

The following year Mr. Clark began his series of experiments by fencing 11/2 acres from one side of this field. This he inoculated with nodule bacteria, after which it was seeded to hairy vetch and cowpeas. From this 31/2 tons of hav worth \$10 per ton were produced. Immediately after the hav was harvested this 11/2 acres was seeded with cowpeas which were sold standing in the field for \$35, thus making a total annual income of \$70. This land was then seeded to clover and mixed grasses. The following season it yielded four cuttings of hay aggregating to 5 tons per acre, which was worth \$15 per ton. The next year it yielded 4 tons of hay. The following spring it was planted in corn without the use of fertilizer and produced 45 bushels of corn per acre. The next season it was seeded to rye and vetch and gave a very profitable return. The rye

and vetch which were left, seeded the ground and \$40 worth of hay per acre was taken from the field the following spring. It was then planted in corn and yielded a good crop.

With the foregoing facts in mind, it behooves the American farmer to so arrange his scheme of cropping that at least one of the legumes has a permanent place in his crop rotation. He must learn to let the bacteria work for him.

We have about one hundred million people that depend almost entirely

on the products of the American farm for food. To supply this demand, and at the same time keep the thought of permanent agriculture in mind, we must utilize the advantages that nature has so bountifully provided. As a nation we can no longer afford to do exploitive farming, where it is the policy to get from the soil the greatest amount in the shortest time with the least possible cost, and without returning anything to the land.

CLARKSVILLE FIELD STATION FOR TTE INVESTIGATION OF TOBACCO INSECTS.

By J. N. GILMORE, '15.

The U.S. Department of Agriculture, Bureau of Entomology, Division of Southern Field Crop Insects, has situated at Clarksville, Tenn., a Station, which works in co-operation with the Tennessee Experiment Station, for the purpose of investigating tobacco insects. Clarksville is in the midst of the famous Black Patch tobacco district, where much of our tobacco for foreign trade is grown. Professor A. C. Morgan, a Cornell graduate, is in charge of this most important work. He is assisted by S. E. Crumb, formerly of Kansas, and D. C. Parman, a U. T. graduate, for six months of the year the remaining period, the latter is employed in Texas investigating the diseases of cotton.

This Station or "Bug-house," as the citizens call it, has a very good equipment for the various lines of investigations and demonstration which are yearly carried on there. There are five main rooms of the Laboratory; the office, assistant's workroom, poison or chemical, breeding, and dark room. The name suffices to explain the contents, etc., of the room in most instances, concerning the poison room we might add that the several experimental types of dust-guns are kept here as well as arsenates, "carriers" and weighing and mixing instruments. There is apparently sufficient poison in this room to depopulate the entire city of Clarksville. In the breeding room, which is really in the Laboratory yard, we find apparatus for the determining of the life histories, habits, etc., of any insect which may be found on tobacco. An experimental plat near the Laboratory is also used in the breeding work, the Hornworm Moth emergence being carried on here.

The most important season of the year for these tobacco experts is of course the growing season of tobacco when they must keep in touch with growers of the near-by counties, investigating and suggesting remedies for any reported ravages of insects upon their growing crops not necessarily tobacco but also fruits and cereals. New insects are being con-

stantly found upon tobacco, despite the fact that already there have been found over 250 distinct species of insects infesting tobacco in one way or another. The successful control of tobacco insects is therefore of economic importance, especially when we learn that millions of dollars are lost yearly, due to the damage of barely one-half dozen species; the larvae of the Southern Hornworms, the Flea Beetles, the Bud Worms, the Split Worms, the Cut Worms and the Cigarette Beetle, which attack the manufactured product.

The principal methods employed in combating these insects are by the use of the paris green and by handwhich most picking. Paris green, growers use, is apt to "burn" the tobacco and cause the leaves to drop if over 1 1-2 to 2 pounds are applied per acre. A costlier but non-burning, or otherwise injurious insecticide, is arsenate of lead, which should be applied at the rate of four pounds per acre with wood ash siftings for a car-This poison does not act so quickly, but is strictly non-injurious to plants even in the hands of an inexperienced operator.

The chief aim of A. C. Morgan, chief of the Station, is to conclusively demonstrate to the Black Patch tobacco growers that lead arsenate far surpasses Paris green as an insecticide on any crop. Many growers are arranging to use lead arsenate entirely next summer. Others state that they wish to see it tried and to experiment with it themselves. Any prejudice against lead arsenate is fast losing ground and will soon be gone entirely.

It is highly desirable that many tobacco growers be reached this winter and spring preparatory to demonstration work upon portions of their crops the coming summer. Besides this work the office force are required to keep an alert eye upon insect depredations reported by warehouses and cigar and cigarette manufactories. Thus these men have an interesting as well as a difficult task to perform.

During the past summer the writer, in company with Mr. B. P. Hinkle, had the privilege of working with Mr. Morgan as collaborators. Both of us enjoyed the work and found it both interesting and instructive.

ACID AND ROCK PHOSPHATE.

By E. M. DEMENT, '15.

Phosphorus is one of the three elements so much needed in soils, excepting those soils of phosphatic origin and they are not plentiful. It is the element which helps in the development of seeds and is used more abundantly where the seed of a plant is sought, as in the case of beans, peas, grains, cereals, etc.

The principal source of phosphorus is from finely ground phosphate rock, raw or treated with sulphuric

acid. Different rocks vary greatly in their per cent of phosphoric acid, some ranging as high as seventy per cent, in the case of the Tennessee rock. There are two classes of phosphate rock, namely, the black and the white; the black being divided into two varieties, the Nodular and the Bedded. The Bedded is the most used variety and is formed beneath the layers of the Nodular phosphate; it is the more abundant of the two.

There are phosphate beds in Tennessee, South Carolina, Florida, and Canada. The Tennessee beds were discovered in 1893, and were surveved and maps made of them in 1895. There are other forms phosphorus used for fertilizer, some of them being Thomas slag, bone meal, tankage, guano, and fish scraps. Whole fish are often used when they are worthless as food. There is a fish caught near American shores which is steamed and pressed for its oil, the remainder being used for fertilizer. Thomas slag is the slag left in the production of iron from phosphatic iron ores. Tankage consists of the scraps from packing houses. canneries, and such establishments. Bone meal is ground bone, raw or steamed, the latter being preferable since it is higher in available phosphoric acid. Raw bone meal is often used because it contains more nitrogen than the steamed, but it should be used as a permanent fertilizer, since it becomes available very slowly. It is probably the highest priced of the materials used for their phosphorus.

Superphosphate or acid phosphate is made by dissolving ground rock in sulphuric acid. This form of phosphate is used perhaps more than any other material as a source of phosphorus. The raw rock form is being used where the soil is filled with humus and is often mixed with stable manure before it is applied. On acid soils, Thomas slag can be very profitably used, since it has enough lime in it to help in making the soil alkaline besides furnishing phosphorus.

The acid phosphate is most popular since liming does not affect its solu-

bility so much, and the Thomas slag is not plentiful; however some prefer the raw rock since it is cheaper and more of it can be applied. Many prefer to use the acid form and apply small amounts at shorter intervals. It is not a waste to apply an excess of this element since it does not leach out of the soil or at least very slightly. If there is plenty of lime in the soil, the acid form makes a phosphate of lime which, though insoluble in water becomes available about as fast as plants can use it. In case lime is lacking in the soil the phosphorus combines with iron and alumina in which form it is very insoluble. So if phosphates are to do their best work, the soil must contain sufficient lime.

In an experiment with seed cotton the application of phosphates doubled the yield of seed. In experiments with wheat the vield was increased by about five bushels as shown in bulletin 90 of the Tennessee Station. It seems that acid phosphate is the most profitable in wheat production, whether cow-peas are removed or turned under, according to their experiments. In some of them where no lime was used, Thomas slag or ground raw rock was best; but when lime was used the acid form was best, since the lime neutralized the acid which makes the raw rock available. All kinds of peas, beans, clovers and alfalfas need phosphorus and in fact will add little nitrogen to the soil if it is lacking. Therefore, if these crops are to be soil builders, they must be supplied with phosphates. In fact any of these crops if continually removed will deplete the soil very rapidly because of the large amount of this element they remove.

The form in which to apply phosphates will depend upon the price, the crop grown, and the fertility of the land. On poor land the plain acid phosphate is usually the best for most crops. On land rich in humus and moist but sour, either the ground

rock or the Thomas slag are very effective, especially with legumes. If the latter are used, it is better to apply a larger amount, say two hundred pounds of Thomas slag each year or one thousand pounds or ground rock every five years.

THE PROPER USE OF COMMERCIAL FERTILIZERS.

By C. M. HAENSELER, '14.

Many farmers that have used fertilizers and have failed to get good results cling to barn-yard manure as their only soil improver, and will, under no circumstances, use anything else. Their arguments are that fertilizers bake the land, burn the crops and are too high priced, while manure has none of these faults. It is true that manure is better than fertilizer alone, and if the farmer can get all the manure he needs, soil improvement is a very simple matter, but where is the farmer, besides the dairyman, who has this manure supply. And it is out of the question with most farmers to buy manure. for the supply is very limited except in cities. What shall be done then? Surely not do without adding anything for our state shows too clearly already, the bad effects of continuous cropping without feeding soil.

If we cannot get manure, there is nothing left except commercial fertilizers. But what shall be done to prevent the baking of the land and the "firing" of the crops which fertilizer so often cause? Consider why manure does not cause these bad effects. The only difference between manure and fertilizers is that the former contains a large amount of vegetable matter, while the latter

contains none. All that is necessary, then, is to add vegetable matter in addition to the fertilizers in order to make them equal to manure.

The question of vegetable matter is quite easily solved. Plant your field to crimson clover in the fall and apply a fertilizer containing acid phosphate and potash. In the spring you have a great mass of vegetable matter evenly distributed over the field. Turn this entire crop under when at its best, and you have supplied your soil with vegetable matter cheaper than you could have done by the use of any kind of manure.

There are quite a number of crops that might be used instead of clover but this crop, where it can be grown easily, has many advantages over the non-legumes such as rye or wheat. If the soil is poor, rye will probably be better since the clover is very apt to fail; or rye and clover mixed could be used if the soil is fair. If humus were all that is needed the clovers would not be any better than rye or wheat for turning under, but the question of plant food must also be considered. When a farmer buys the complete fertilizer that is called a 2-8-2 goods, he is giving almost half (43 per cent) the cost of the fertilizer for the one element of plant food, Nitrogen. The other half (57 per cent) is given for the Phosphorus and Potash that is in the fertilizer.

Why should the farmer buy this high-priced Nitrogen when he can get all he needs at the same time he is getting his vegetable matter and at no additional cost? every farmer in the state, through the good work of short courses, the agricultural department of the University and the agricultural publications known that the clovers have the power of gathering Nitrogen from the air and storing it in the soil in such a form that the following crop can use it. Rye and wheat do not possess this power and it is for this reason that they are not advocated for green manure crops when good crops of clover can be grown.

This fact about clover also gives some information as to what fertilizers should be used. As it gathers its Nitrogen from the air this element need not be applied. All that is necessary, thus, is acid phosphate and potash. Never buy the complete fertilizer, but buy the potash in the form of muriate of potash and the phosphorus in the form of acid phosphate, mix them yourself, apply to a fall sown clover crop which is to be turned under in the spring. The nitrogen alone that is gathered by the crop will more than pay for the seed and labor.

This may not apply to the market gardener or the dairyman for they have conditions which require different management. The gardener can seldom afford to let his land lie for a half year just to save a fertilizer or manure bill. The value of crop that could be harvested during that time may justify his buying large quantities of manure instead of growing it. It may also be good practice for him to use complete fertilizers since he can afford to spend considerable to get a crop of extra quality or earliness. But he should not buy fertilizer ready mixed, but should buy the raw materials and mix them himself, thereby saving from four to six dollars on each ton. On the dairy farm where large amounts of manure are made and where good feed can be used to such great advantage, it will be better to harvest the clover crop instead of turning it for green manure. Since the dairyman always buys a great deal of highly nitrogenous foods for his herd, the nitrogen supply of his soil will be well cared for if the manure is properly handled; but phosphorus and potash will have to be supplied as fertilizers. Of course manure contains phosphorus and potash as well as nitrogen, but it is especially rich in the nitrogen, while the amounts of the other elements are relatively low, the phosphorus in particular. It should be remembered that manure alone is not a perfect plant food and that phosphorus, at least, should be applied with it.

It will be noticed that in the method of fertilizing here advocated, the clover, or the legumes in general, become leading factors. Many farmers have trouble in growing the legumes, in which case this system will at once be rejected. But why have they trouble? It is almost always because the farmer does not understand his soil and the needs of the legumes. This type of plant is especially fond of a limy soil and if the soil is at all acid they will suffer. It is the lack of lime that is almost invariably the cause of poor

clover, that is if the soil is not too poor or too wet. If the soil is acid, the addition of one ton of burnt lime or two tons of finely ground limestone per acre will usually make conditions favorable for a good clover erop.

The following are some of the principal points that a farmer should remember about commercial fertilizers:

- 1. The continuous use of commercial fertilizers without the addition of vegetable matter will ruin the soil.
- 2. If heavy applications of fertilizers are made upon soils deficient in vegetable matter the crops may be "fired" especially in dry weather.
- 3. In general farming the vegetable matter of the soil can be main-

tained more cheaply by the use of green manure crops than by any other means.

- 4. The legumes are the best for green manuring, since they add to the soil, besides vegetable matter, a large amount of nitrogen, the most costly of the plant foods.
- 5. In general farming little nitrogen should be bought.
- 6. Home mixed fertilizers are cheaper than ready mixed.
- 7. Lime should be used on acid soils.
- 8. Fertilizers are very costly if used thoughtlessly, but are the cheapest and most effective soil improvers when properly used.

IMPORTANCE OF THE QUAIL.

By J. M. OSTEEN, '15.

The quail is one of the most widely distributed and best known game birds of the United States. It is called a "game bird" because it is so popular with sportsmen, but the quail is really the farmer's friend. A few sportsmen hunt wild geese, duck, etc.. but almost all hunt the quail.

While they are excellent game birds, the farmer considers them more valuable as a protection to his crops against weeds and insects, and for this reason most farmers are protecting them in every way possible. Not only farmers, but legislators as well, realize their value.

The habits of the quail are well known. They move about very actively and feed in the early morning and late afternoon. They roost on the ground forming a solid ring with tails in and heads out. Their roosting places are generally in patches of ragweeds, wheat stubbles, corn fields, broomsedge, grassy pastures and very seldom in woods. They seek the woods in the day as shelter from the enemy and regard the open field safer at night.

The fact that the partridge feeds late in the afternoon and early in the morning and roosts in the open field is proof that they receive their food in the field. It has been found by careful observations that they do no injury to growing grain and fruit. Their crops have been found stuffed with all kinds of injurious weed seed and insects. Some of the common insects they eat are the chinch bug, potato beetle, cotton boll weevil, cutworms and army worms. They are the only birds that eat the potato

beetle. They do not feed along fence rows, in brier patches, and such places where their service is not needed as do many other birds, but they go over the entire field, going from stubble fields to corn fields, cotton fields and so on.

It might be thought that amount of injurious weed seed and insects destroyed by the quail would not benefit the farmer very much, but let us suppose that there are only four birds to every square mile in Tennessee, which is a small estimate. This would make 168.200 birds in the state of Tennessee alone. The crop of each bird holds about one-half an ounce of seed and is filled twice each day. Weed seed constitute at least one-half of their diet. which makes one-half an ounce of weed seed that is consumed daily by each bird. On this basis the total consumption of weed seed from September 1st to May 1st, which is the season when the largest proportion of weed seed are destroyed by birds. would be 1,682,000 lbs. or 841 tons of injurious weed seed. Insects form about one-third of their diet from May 1st to September 1st, and a calculation similar to the one above shows that a fraction over 280 tons of insects are destroyed by these birds. When we think of the enormous number of injurious weeds that would come from 841 tons of small seed and the destruction of crops from 280 tons of harmful insects, and bear in mind that these birds do not destroy growing grain and fruit, we realize something of their value. If the four birds in one square mile saved the replanting of a ten-acre field of corn in that section by destroving the insects, they would have saved the owner more than he could have gotten from them as food, because the seed corn alone would have been worth \$1.00, to say nothing of the extra labor, etc., and 25 cents is a fair price for a dead quail.

If they were in such large numbers that apparently all were not needed, then the landowner might kill a few or demand a fair price from the sportsman for the birds killed on his property. Some sportsmen would willingly do this, as they derive great pleasure from bird hunting, and would rather pay a fair price to hunt the quails than to hunt other kinds of game without cost.

The game legislature of 1911 exceeded in volume that of any previous year and changes were made in the warden service, control of the license funds, and also modifications of seasons. Regular sessions were held in all the states except seven and laws affecting the protection of game were passed in all except Nevada. The total number of new laws were about 260. Notable modifications were made in enforcement provisions. Some states reorganized their warden forces while others increased or strengthened them. Some difficulty arose in regard to the unregulated control of large sums of money derived from the large sales of license, but in several states a part or the whole of such funds were turned over to the state revenue funds for making appropriations to protect game. Many important modifications in seasons were made; the general tendency being toward shortening the hunting season.

These laws were passed for the protection of the quail especially,

thus showing that the legislature recognizes the value of this bird to the farmer.

Mr. T. S. Van Dyke says: "Dear little 'Bob White' has brought more

rest to the business-wearied soul, more new life to tired humanity than nearly all other American game together."

IRISH POTATO RAISING IN CUMBERLAND COUNTY.

By GEO. F. BROOKHART, Peavine, Tenn.

This is the final report of the member of the Cumberland County Boys' Potato Club, who won the \$10.00 prize for the best written report. This is the first and only potato elub

in Tennessee and has demonstrated that Cumberland County soils can, in one year, be made to grow potatoes profitably.—ED.

The one-half acre plot of ground, on which I produced 134 bushel and 53 pounds of marketable potatoes, is a sandy loam, with light clay subsoil.

This ground had been cleared and under cultivation about thirty years. Corn was cultivated on it the summer previous to planting the potatoes. The soil was not very rich, but only average soil of the farm.

On April 23rd I hauled and scattered six and one-half loads of stable manure on the ground.

April 24th, I turned it with a No. 43 Chattanooga Plow, to the depth of 7 inches, and floated it to break up some of the clods.

On account of wet weather, I let it lie till May 8th, when I cross harrowed with a 5-tooth Planet Jr. cultivator.

It now being time to plant, May 20, I disc harrowed it lengthways, lapping half or double discing, and floated to even up for furrowing out. In furrowing out, I used a bull tongue plow with a very broad shovel, and ran the rows three feet apart, and about 5 inches deep.

Next the fertilizer was sown in the furrow by hand. I used 200 lbs. 16 per cent Acid Phosphate, and 190 lbs. Globe Fertilizer, which analyzed Nitrogen 1.65, Potash 7.50, Phosphoric Acid 8.00.

After sowing fertilizer, I again ran through the furrow with a narrow shovel plow to loosen up the bottom and mix the fertilizer well into the soil.

May 21-22 I planted the seed, dropping the pieces about 18 inches apart. I planted the Green Mountain variety. Five and one-sixth bushels were used to plant the half acre. These were first treated with the Formalin solution for scab, and then cut into two and four pieces according to size of potato.

In covering I used a 5-tooth cultivator with the hind shovel removed. This filled the furrow full of nice, loose soil. They were then left till cultivation began.

I cultivated once before they came up, and six times afterwards. I also hoed them twice to remove all weeds that had escaped the cultivator. In cultivating care was taken not to allow a crust to form after each rain, and not to cultivate too close to the potatoes and not too deep after the potatoes were very large. During

cultivation I applied 48 lbs. of Nitrate of Soda as a top dressing. This was sprinkled around the plants by hand and then cultivated into the soil.

I dug the potatoes October 17th and 18th.

I believe the Blight decreased the yield at least 10 per cent. I believe that it would be profitable to spray for blight in this country.

If we would buy the material and mix our own fertilizers I think that we would save money, and get a fertilizer better adapted to the needs of our soil.

Following is a list of all expenses and net profit, counting my time at 20 cents an hour, which is more than I could make at other work, and counting all hired labor at actual cost.

Total yield was as follows: 134 bu. 53 lbs. marketable potatoes, and 14 bu. 9 lbs. culls, or a total of 269 bu. 46 lbs. marketable potatoes per acre.

Expenses and Net Profit.

Rent of land, $\frac{1}{2}$ a. @ \$5 per a. \$2.50
Preparation of seed bed 1.86
Cost of Planting 3.70
Cost of manure, 6½ loads @ \$2
per load 13.09
Cost of Seed, 5 1-6 bu. @ \$1.50
per bu 7.75
Cost of Fertilizers 6.42
Cost of Cultivation 3.92
Cost of gathering 10.00
Total cost\$49.15
Value of crop @ 50c per bu\$67.44
Less Total Cost 49.15

Net profit per half acre\$18.29

SKIMMILK-BUTTERMILK.

By W. S. Myers, '15.

In the manufacture of skimmilkbuttermilk, the first and most important essential is a good flavor. Next in importance is the uniformity of the product. Both of these essentials can be obtained with certainty only by the use of pure culture of lactic acid bacteria in souring the milk. Skimmilk-buttermilk is a combination of whole milk and separator skimmilk in the ratio of one gallon of whole milk to twenty gallons of skimmilk. This gives the mixture a fat content which approximates that of ordinary good buttermilk

The next process is to aerate and cool. During separation a considerable amount of air gets into the milk. As a result of this air getting

into the milk a foam is formed which proves unfavorable to the manufacture of desirable products. easy to get rid of this foam. If the milk is allowed to stand for a few minutes after separation the foam will rise to the top where it can be skimmed off with a dipper or the milk can be drawn off at the bottom through a faucet. After this the milk should be cooled as quickly as possible. The best method of cooling is to run the milk over a cooler of some kind. If a cooler is not available, the milk can be cooled by placing it into spring water or in an ice box. No matter what method of cooling is adopted it is very important that the milk should be cooled as quickly as possible and kept as cool for twenty-four hours to allow it to age sufficiently. After this process is finished, add a large quantity of starter for souring the milk. The best temperature at which the milk should be held is 70° F. brought higher than this the milk has a tendency to whey off. enough of the starter to curdle the milk in about six hours, viz., for every three pounds of skimmilk add one pound of starter after the milk has been thoroughly curdled, it is then churned for about 20 or 30 minutes in the same way as cream is churned to make butter. churning thoroughly breaks up the curd clots, leaving a smooth thick liquid which cannot be distinguished from ordinary buttermilk. Immediately after the milk leaves the churn the temperature should be reduced to below 50° F. to prevent further development of acid and the separation of whey. To obtain this result ordinary milk and cream coolers with enlarged holes in the distributing receptacle, will serve the purpose very satisfactorily. As the milk is taken it should be run through a strainer consisting cheese cloth in order to remove any curd clots that might not have been broken up during the churning.

The marketing of this product is also very important. It is necessary in the first place, to explain that this product, when made as herein described, is almost identical with the highest grade of natural buttermilk both in composition and physical properties, and therefore in wholesomeness and palatability. Under average conditions it is not thought possible to secure natural buttermilk of as uniform a quality or as fine a

flavor as can be obtained from skimmilk and whole milk in the ratio of one gallon of whole milk to twenty gallons of skimmilk. When these facts are explained to dealers and consumers, any prejudices which may have previously existed as to the quality and flavor of this milk are almost certain to vanish. In order to let the public know that you manufacture the milk you must provide the dealer who handles your milk with attractive signs calling attention to the fact. This product also should be for sale at all soda fountains, but unless some conspicuous sign is posted at these places, the public will never know that it is for sale there.

The average price is about twelve cents per gallon, but at seven cents per quart it would be no more expensive considering its food value, than steak at fifteen cents per pound. In the larger cities it will sell at a much greater price than that quoted above. At Norfolk, for instance, when furnished in bulk it sells at twenty-five to thirty cents per gallon. It may be considered cheap at ten cents per quart, if we consider its food and tonic properties. most satisfactory way, however, of disposing of this milk is by selling it direct to your cream and milk customers along the dairy route. because the profits of the middle man are then added to those of the dairymen. This would mean an increase in profits of from ten to fifty per cent. By selling to the consumer direct the product would be fresh and would not entail any delivery charges since it could be delivered at the same time as the cream and milk. If the dairyman should produce more of this product than he could dispose of directly to the consumers he could furnish a supply to the local dealers in dairy products. There is no doubt but that a profit can be realized by the manufacture and sale of the dairy by-product by many dairymen if they handle the product as above outlined. It should be a source of revenue without much cost to the producer.

The dairyman is at a disadvantage however because this product is not very well known. He must build up a trade. If the public is once assured of the genuineness of your product, you will probably experience little difficulty in disposing of the product at fair prices. To retain this trade is required accuracy and attention to details.

TENNESSEE'S FIRST ANNUAL SALE OF DUROC-JERSEY SWINE.

By C. M. HUME, '14.

While the old adage, that "opportunity knocks at a man's door but once," is fortunately not always true, yet the farmers and stockraisers of East Tennessee, who failed to attend the "South's First Annual Sale of Duroc-Jerseys" of Dr. S. H. Stanbery and Sons at the Experiment Station, missed a rare opportunity.

The firm of S. H. Stanbery & Sons, located at Newport, Tennessee, has spent considerable money, during the eleven years in which they have been breeding pure bred Duroc-Jerseys, in securing the best stock obtainable. Combined with this has been put judicious breeding, which has enabled them to establish a herd favorably known over the United States and Canada and has won among the foremost producers, an enviable name, not only for the Stanbery's, but also for Tennessee. And the 66 head offered for sale last Saturday at Temple Hall, were fully up to the standard, containing among its numbers Grand Champion boars and sows.

Of this number, it is gratifying to note, 32 will stay in Tennessee, yet 16 go to Kentucky, 19 to Alberta,

Canada, 4 to Arkansas, 2 to Alabama. 1 to Virginia, and 1 to Montana. But numbers do not tell the whole story, for the hogs which go outside the state were, on the average, better than those sold to residents of the state.

The point, which we Tennesseeans should note is, that we let breeders from Virginia, Kentucky, Arkansas, Alabama and even from Canada, buy this stock, although it sold for much below its real value. Tennessee has been pronounced, by competent judges to be an ideal hog producing section, yet why did we let those wide-awake Northern breeders slip away with stock we need so badly?

We are glad to say, that although Doctor Stanbery feels that his stuff went at a pretty low figure, yet he is not discouraged and hopes to come back next year with a good showing. Such a spirit certainly deserves the support of all men, who have the interests of the state at heart. It means much to the development of successful agriculture to have honest, capable, fearless men backing its livestock interests.

CROP ROTATION IN TENNESSEE.

By G. B. THACKSTON, '14.

The great cry that is now being sent up by the Tennessee farmer is one of dismay on account of the fact that the revenue from his soil is gradually becoming smaller as the years pass by and he sees in the near distance the time when, without a miraculous change, he will be unable to reap returns enough from his little farm to provide food and shelter for himself and those dependant upon him for support.

What is the cause of this great calamity that stares us in the face? It is simply the fact that for years and years, generation after generation, the Tennessee farmer has been taking from Nature with an unsparing hand, any and everything that she has held out to him, with never a thought of ever, in any way, giving recompense to Nature for what she has so freely allowed to fall to him. But the liberality of Nature has its limits, which we now begin to feel in that no longer will our lands fill our barns to bursting and the little that we are enabled to wring from Mother Earth is bought by the sweat of the brow in weary and never ending labor. ·

The cause of this lack of prosperity on the part of the farmers of Tennessee can be attributed to but one thing and that is the general system of farming that is now employed in this state. Crop follows crop in such rapid succession that no thought is given to a rotation, the only idea being to get as much money as possible for the time being, giving no thought to the future.

Cover crops are unheard of. The land is left bare during the winter while the rains carry away the top soil and the plant food. The fact that every crop takes a certain amount of plant food from the soil seems to be forgotten, and we hear people wondering why a certain field does not produce as much as it did several years ago; yet, this same land has been producing a crop every year for years, giving up its plant food and receiving nothing in return. It is a fact that commercial fertilizers have been used to a certain extent but in most cases it is with such poor judgment that the effects are of little value, the money all but wasted, and some times real harm caused. Neither the requirements of the crop to be grown nor the composition of the fertilizer is taken into consideration, simply the fact that a commercial fertilizer is being used seeming to make it satisfactory. Even the manure that is made upon the farm is, on the greater number of farms, left piled in the open barnvard to allow the rains to leach away its valuable plant food. How many farmers know that an average ton of barnvard manure is worth from \$2.50 to \$3.00 in plant food alone besides its value to the soil as humus and many other ways.

How are we going to change the general system of farming so as to bring about the desired results and still make it practicable for the average farmer? Perhaps not a cureall for every ailment but just as cortainly a system that can be used ad-

vantageously by every farmer in the state, is a system in which a rotation of crops is practiced.

A rotation is simply a system of farming in which the same crop is not grown on the same land successively for years, but where the leguminous plants alternate with the non-leguminous, gathering the nitrogen from the air and storing it in the soil where the plants that feed heavily on nitrogen can obtain it; where deep-rooted plants alternate with shallow-rooted ones, one taking that plant food close to the surface, the other taking that farther down; and where a cultivated crop alternates with an uncultivated crop, so that the weeds may be held in check and not allowed to use the plant food stored in the soil.

If we should take for an example, those sections of Tennessee where corn and wheat are the principle crops, if a rotation is even attempted, it is something as follows for a three-year rotation:

(Numbers correspond to the years).

1—Corn. 2—Winter wheat or spring oats. 3—Clover.

In this case the corn is pulled in October and the stalks are either cut and burned or else turned under when plowing for the next crop. Wheat probably follows this with as little preparation of the soil as possible. If spring oats are used the soil is left bare during the winter and the heavy rains carry away the plant food and mark the field with gullies. In either case clover is sown in the early spring and left until the next year for a hay crop. The sod is turned in the spring of the fourth year and again planted to corn. In this rotation, two non-legumes come together with no cover crops and no green-manure crops for turning under, and there are also two shallow-rooted crops coming together. Why not use a rotation something like the following for four years:—

1—Corn; rye for a cover crop. 2—Soy beans. 3—Wheat. 4—Clover.

Here we have every principle of a rotation,—corn and wheat are non-legumes, cultivated and shallow-rooted crops,—soy beans and clover are legumes and deep-rooted. The rye can be sown at the last cultivation of the corn and a little crimson clover may be used with it if possible. This covers the land during the winter and is ready to turn under next spring for a manure crop. The clover can either be sown in the wheat or the land may be summer-fallowed and the clover sown in August.

For the cotton and tobacco sections the following three-year rotation may be used:—

1—Corn; peas, (rye or oats). 2—Cotton or tobacco; rye. 3—Beans or peas: rye.

Peas may be sown in the corn at the last cultivation and winter oats used for a cover crop, or rye and crimson clover may be used.

What the practice of a good rotation system would mean to agriculture in Tennessee is almost beyond estimation. Instead of farm land decreasing in fertility every year as it is now we would have just a little better farm each year than we had the year before. Then the "Back to the Farm" movement would not be a dream but a reality. The farmer would then take his place at the head of the nation where he belongs and where he is sure to be when rational methods of farming are adopted, but not until then.

THE U. T. FARMER

Scientific: therefore practical

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EDITORIA

VIITH the end of this month, the most successful series of Short courses in the history of Tennessee will be brought to a close. The hundreds of farmers, young and old, who have attended the short courses, both here and at the other places in the state, should be the means of greatly elevating the type of farming in many counties throughout Tennessee.

THE Cumberland County Boys' Potato Club is a move in the right direction. The Cumberland plateau is, indeed, a problem to agriculturists of the state. There is no denying the fact that there are certain other portions of the state that are more blessed with fertile soil, vet those who have studied the soils and climate of this region prophesy a bright future for it. Mr. J. E. Converse, realizing the importance of showing the crop producing power, organized in Cumberland County a

Boys' Potato Club similar to the corn clubs that are now so popular.

This club has shown that potatoes can be grown here at a profit, one of the boys during the past year making a net profit of \$111 per acre on a yield of 379 bu. per acre. Six boys made yields of 352 bu. per acre at a net profit of \$88 per acre. The average of the club was 258 bu. per acre at a net cost of 30 cents per bu., the highest record of the club being 384 bu. of salable potatoes. This is the first year of the club and they expect next year to raise 500 bu. per acre. The quality of potatoes raised in this region are said is be unexcelled.

CUCCESS in farming as in other lines of business often depends on the manager's ability to do the right thing at the right time. When the farmer is often rushed to harvest another or else has not plowed the land or he is so late in plowing that he cannot properly prepare the land. One of the great values of a rotation is that the work is planned in advance. February is indeed a month of preparation. It is not a month for planning, that should have been done during the last two or three months. Plans for the year must now be made so as to use every moment possible during February in preparing to carry them out.

IF the student of an agricultural I college merely learned a few facts from books or from class room lectures the course would not be any more interesting than the other courses of the University. It is the "out-side" things that make the Agricultural course so interesting. There is so much to read and think about aside from his lessons for tomorrow. One of these things was the sale of Duroc-Jerseys at the Farm on Jan. 18th. Many students said this was the first sale of the kind ever attended by them, and all agree that it was a whole course of swine judging boiled down into one great lesson. The value of such an event as this in the life of a student is hard to estimate. This is also eminently true with the farmer.

GARDEN NOTES.

Make up your mind now to give that kitchen garden just a little more time, a little more preparation, a little more cultivation, and a little more thought than you have ever given it before, and see to it that your resolution isn't broken in even the least of these.

Take pencil and paper and plan that garden now so that no time may be lost when planting day comes.

If you haven't already done so, get the manure out right away and spread it evenly over the ground and don't be stingy with it.

If you allowed the garden to grow up in weeds last fall, cut and burn them now and by so doing, kill as many of your little garden enemies as possible.

Plan the garden for your own benefit. See that there are vegetables in plenty for the table during the long, hot summer months, and do not neglect to provide vegetables for next winter.

Remember that good vegetables are those that have grown rapidly, that is, have had all advantages of fertilization and attention, and also all these same factors will mean an increase in the total crop.

Lay out the garden with the rows running lengthwise of the patch and at sufficient distance from each other to allow of horse cultivation.

Get seed catalogues, and find the varieties of vegetables best suited to your needs and get them. Do not get just any variety that the seed man happens to have the greatest supply of.

NEWS ITEMS.

Tuesday evening, January 21st, following an unusually interesting program, the Agricultural Club elected the following officers:

President ... Neely
Vice-president ... Hite
Secretary and Treas ... Thackston
Critic ... Shelby
Sergeant-at-Arms ... Hutton

The club room looks very attractive with all the new pennants up.

We have been visited within a month by several of our Alumni Ags: Brooks, '12; McAmis, 12; Tipton, '11; Murphy, 09; and Neal, '07.

January sixth, Farmers' Week began and ran at top notch for the whole week. Farmers from all parts of the state as well as from East Tennessee were present and many interesting speakers from other states figured in the program. This was the first annual meeting of Farmers' Week, and was held in Temple Hall, which has been fitted up with steam heat. Lunches were served the entire week by the Agricultural Club.

Jan. 8 the Annual "Short Horn" reception was given by the Agricultural Club. The program contained both heavy and light speaking with refreshments and cigars.

On the 18th, Professors Bain and Keffer gave addresses before the Georgia Breeders Association at Athens.

Professor Pridmore has been attending the 5th National Corn Exfollowing an unusually interesting position at Columbia, S. C., for the past week.

Word has reached us that the bashful graduate of last year, Mr. R. R. Blake, can no longer be numbered among the merry band of bachelors. He married Miss Celia Lay, of Jasper, Tennessee on Saturday, December 13th.

"What's the news?" "Oh, I don't know; nothing new." This is the usual answer given the reporter who strives to fill this page.

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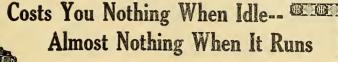
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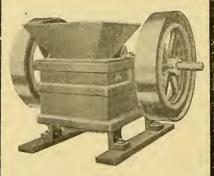
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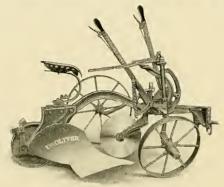
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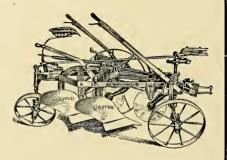


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Vol. VII.

MARCH, 1913 Published Monthly by No. 6

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OUR FUTURE BEEF SUPPLY.

By T. H. Dougherty, Special.

The supply of beef cattle in the United States is diminishing year by year. It reached the high water mark in 1907, when it was fifty-two million head. In 1912 the number had decreased to thirty-seven million-a loss of almost thirty per cent. In the same period our population increased approximately ten per cent, making the decrease in supply of cattle with reference to consumption more than forty per cent. And yet we wonder at the high price of beef. The indications point to a still higher level in the price of beef cattle. The great decrease in supply has not yet been felt keenly in the market. The very fact, that the number of farms is so much less than in 1907, shows that large numbers have been rushed on the market. The increase in price will cause this to continue for perhaps another year, but there is bound to be an end of the marketing of the breeding stock. Then the real lack of supply will be felt and beef will soar to unheard of prices.

The present condition cannot always last. Then where shall we look for our future beef supply? It is plain that we cannot look to the West, for further immigration to the Western States will tend to break up the great ranches in that section. Nor can we look to the North, for a glance at the statistics will show that the heaviest decrease has been

in the Northern States. By elimination then we have left, the South.

But that is not the only reason for believing that the great beef center will shift toward the South. Opportunity for the immigrant and necessity for the native will unite to make this the greatest beef-producing section in the world.

Since the invention of the cotton gin the effort of the South has been to produce cotton, and more cotton. Cotton has been followed by cotton until the fertility of the soil in many sections has reached an unprofitable stage. Intelligent Southern farmers are beginning to realize that something must be done to build up their depleted soils. There is one great principle in building up any soil—return to the soil at least a part of what it produces. This can be best accomplished by the feeding of live stock on the farm.

The great feeding value of cotton seed meal has not long been known. A number of experiments have shown that it is indispensible to successful cattle feeding. The cost of transportation of cotton seed meal will give the South a decided advantage over any other section of the world.

The Southern climate is almost ideal for cattle raising. They can be grazed for the greater part of the year and carried through the winter with much less feed than in other

sections of the United States. Besides, since there is no necessity for expensive barns, one may operate with much less capital. In fact close housing produces tuberculosis. As a result of open-air feeding the ravages of this disease in the South are very small.

One of the great hindrances to cattle raising in the South has been the Texas Fever Tick, but the limits of infected territory have narrowed so rapidly that the complete eradication is now within sight. With this troublesome pest destroyed we believe the cattle industry will take on new vigor.

Another great drawback to beef production in the South has been the lack of good markets. We have been shipping our cattle to St. Louis and Chicago, having them killed there, and again shipping back the dressed carcass for consumption. transportation charges were paid in each case, which could have been saved to the owner if he had had a market closer at home. But this difficulty is also being rapidly overcome. Packing houses are springing up all over the South. A large one was built recently at Port Gibson, Miss., which has increased the cattle industry in that section five hundred per cent. Another is in construction at Macon, Ga., in a territory where high-class beef cattle are unknown, but with the impetus of the new packing house the number within a short while is bound to take on large proportions.

Still another obstacle in the way of the production of live stock in general, is our present system of tenant farming. But I believe this very system which has been such an obstacle will in the future augment rather than hinder the cattle industry. Southern cotton farmers have had more land than they could attend. The demand for tenants was greater than the supply and the landlord was forced to put up with such farming as the tenant (usually a negro) was pleased to do. The result is that the soil is greatly depleted. A cattle ranch can be operated with very much less labor than a cotton plantation. The farmer is beginning to see that he can lease half his farm to the tenant and raise cattle on the other half. In this way he has solved three great problems: He can control his tenant much more easily: make his farm vastly more profitable, and at the same time increase the fertility of the soil. Not only that but Southern agriculturists are working out a new system of tenantry, whereby the tenant is induced to make live stock raising a part of his farming operations.

The cotton boll weevil is spreading rapidly over the South. Wherever it appears a panic stricken populace is the result. The solution to the boll weevil has always been, and always will be, a change of crop and a resort to the raising of live stock. It has never failed to prove a blessing in disguise. The boll weevil is one of the forces that will stimulate the cattle industry in the South.

Good land is still comparatively cheap in the South. A man with small means can own enough land to do good cattle farming. This is not true of the Northern and New England States. One must have large capital to own a few acres of land. The Southern cattle farmer in that

respect has a decided advantage over any other section.

Last, but not least, is the influence of the Southern agricultural colleges. Agricultural education is more popular now than ever before. The number of trained men is increasing at a tremendous rate. They will consciously or unconsciously preach the doctrine of live stock in every locality. The South is already looking at agriculture from a different viewpoint. Every student of agriculture should feel a responsibility to his particular section and should throw himself into the great movement of spreading live stock all over the Southern States.

Every indication points toward a new awakening in the South. is beginning to realize her opportunity. Florida was the only state in the union that did not decrease her supply of beef cattle from 1905 to 1912. The rest of the Southern States about held their own, while the North and West took a great slump. The price per head is increasing at a much more rapid rate in the South than in any other section, showing that the quality of Southern beef cattle is being improved. It is only a question of time until the Short Horn in the Sunny South will be as conspicuous for his presence as he has been for his absence.

IMPORTANCE OF THE HOME VEGETABLE GARDEN. By THOS. L. ROBINSON, '15.

The home vegetable garden is an important, and perhaps, the most characteristic feature of practically every American farm. Thousands of village people devote part of their lots to the growing of vegetables for the family table, and a host of people in the suburbs of cities grow at least a portion of their own vegetables. Even on farms where no orchards have been planted, and where the ornamental surroundings of the home have been neglected, a fairly wellkept garden in which is grown a number of the staple vegetables is generally to be found.

The value of the crops grown in the home gardens of the United States amount to millions of dollars annually. Careful investigations have shown that a well-kept garden will yield returns from ten to fifteen times greater than would the same area devoted to general farm crops. Half acre devoted to the various kinds of garden crops will easily supply a family with \$100 worth of vegetables during the year, while the average return from farm crops is less than one-tenth of this amount.

The home garden, however, has other than momentary value. It has properly been termed the "farm drug store." A diet of clean, fresh vegetables counts more for good health than many people realize. Again, many a business or professional man or a tired housekeeper has found pleasure, comfort and health in the care of a garden. When the work is properly managed, it is equally attractive to boys and girls. By means of the home vegetable garden the production of the vegetable supply for the family is directly under control, and in many cases is the only way whereby clean, fresh products may be secured.

The home vegetable garden is worthy of increased attention, and a greater number and variety of crops should be included in it.

Location.

In the selection of a location the following factors should be considered: (1) Close proximity to the house. It should be at least a convenient distance from the dwelling, because much of the work is usually done at odd times, supplies must be gathered daily, and the garden is attractive. (2) A sandy loam is preferred but any soil may be improved so that it will produce good results. (3) Good natural drainage of the garden area is of prime importance. The surface of the garden should not contain depressions in which water will accumulate or stand. (4) A gentle slope toward the south or southeast is most desirable for the production of early crops. (5) It is an advantage to have protection from north and northwest winds by either a hill, a group of trees, evergreens, a hedge, buildings, board fence, or a stone wall. (6) Close proximity to a supply of water is a great advantage. Water is often needed at seed sowing time, transplanting time or for sprinkling. (7) Shade of trees and buildings should be avoided.

Aims.

In planning for the home garden the following definite aims should be kept in view: (1) The production of a liberal, uniform and constant supply of vegetables preferred by members of the family for whom they are grown. (2) Quality counts for as much or even more than in commercial gardening. (3) There should be as great a variety as possible. The tendency is to restrict the plantings to the most common vegetables. The home gardener derives much pleasure in testing the more promising novelties from year to year.

Rotation.

Rotation should be practiced as much as possible in home gardening. It is the means of avoiding losses from the ravages of insects and plant diseases. Several of the garden insects find protection during the winter in the ground or are protected by refuse on the surface. Dead vines and leaves are frequently covered with spores of diseases that affect the crops during season, and if the host plants are grown continually these pests are likely to become more and more destructive. This is one of the strongest arguments for crop rotation in vegetable gardening. Ordinarily, three to five years should elapse between crops of the same species, although less time is sufficient in many instances.

Succession and Companion Cropping

There must be more or less successive cropping in all well managed gardens. Plans for successive croppings are numerous. As a rule it would not be best to have a second planting of the same crop follow the first, but many crops as peas, radishes, beets, bunch onions, lettuce and spinach, if planted very early in the spring, are harvested in ample time to plant the same ground in such crops as sweet corn, beans, cabbage, turnips, tomatoes, etc.

Where two or more crops are grown together the system is known as companion cropping, intercropping, or double cropping. Compan-

ion cropping is most advantageous when the area of ground available is very much limited; land values. rentals and taxes are high; or when liberal supplies of manure are easily available. This plan usually embraces succession. Three vegetables, as cabbage, lettuce and radishes, may be started early in the spring at the same time. The radishes will mature and be removed first. Then the removal of the lettuce, finally the cabbage will have entire possession of the ground; then beans may follow the cabbage. This is simply an example of the many plans for companion cropping.

Tillage.

Both yield and quality of vegetables are determined largely by the character of the tillage operations. Some of the objects of tillage are as follows: (1) To regulate the soil moisture content; (2) to modify the physical conditions; (3) to aerate the soil; (4) to modify soil temperatures; (5) to destroy weeds. There is no rule to be followed in tillage opera-

tions but frequent shallow cultivation should be employed for most garden crops. Hard crusts should certainly not be allowed to remain unbroken for any length of time. Such crusts forming over the soil after a rain are detrimental to plant growth and should be broken as soon as the land can be worked. are never injured by too much cultivation of the proper kind. tillage is unquestionably best except for special purposes. Hilling is some justifiable. but times the excuse for the practice is that it serves to eradicate weeds when they have gotten very much of a start during wet weather.

In tillage, timeliness is of primary importance, since to plow, harrow, cultivate, hoe and weed at just the right time may make the difference between success and failure. There is a proper time in gardening for every tillage operation and fortunate is the man who not only knows when to till, but who usually does the work when most advantageous.

DRUDGES.

By ALICE N. PORTER, '14.

Among the foremost objects that are attracting the attention of the thinking people of today is the organization and improvement of country life. No other problem, unless it be national politics, is so generally discussed and thought of, not only in local districts, but throughout the whole United States. This does not seem so strange when one considers that within the past twenty years, farm lands have more than doubled in value in many parts of our country. Science has revolutionized ag-

riculture and farming is today more profitable than it ever was. The men in the cities and towns are realizing this and are turning to the country more and more. "Back to the Soil" is the slogan all over the land. Agricultural schools are springing up here, there and everywhere, the government is establishing agricultural experiment stations; the railroads are sending out agricultural trains to coax the people into the new areas which are being opened up. Yet many are deterred from going to the

country and many are leaving the farms every day because of the hardships that farm life has for the wives and daughters.

For generations woman's place on the farm has been largely that of a drudge. It is upon her that the brunt of the battle has fallen.—she has waged an unequal war against unequal odds,-man has availed himself of every new invention, every labordevice that science brought forth. Woman has done as best she could with the same utensils and methods which were in vogue in her grandmother's day. It is because of this fact that farm life to the average woman has come to be looked upon as drudgery.

But the farm need not make drudges. One can be a drudge anvwhere,-it takes brains to avoid be-Especially does it take ing one. brains and ability to avoid being a drudge on a farm. There is no higher vocation open to women-no field so wide and offering such vast opportunities as life on a farm. For the girl raised on a farm and whose whole life has practically been spent on the farm, there are never ending problems of interest to be solved. She is familiar with the duties and chores which have been handed down for generations,-let her study how best she can reduce the work, economise labor and save her energy. Let her try for a week or even a day, making a careful study of her motions and see how she can simplify her work so as to have less to do and more time for reading and study. The results will be surprising. Don't be afraid to try new things, to make experiments and improvements.

To the girl just leaving college there is no better place in the world for her to put her knowledge to practical use than right on a farm. The highest training and best education open to women is none too good for the farm wife. She will find her physics, chemistry, hygiene, sanitation, mathematics, invaluable aids in helping her solve the problems with which she is confronted every day. In fact there is scarcely a subject taught that has not its place in her life on the farm. There is nothing to dread in such a life, for it is one of never ending interest for the girl who would have it so.

The farm woman is to be envied. Nowhere can one find greater opportunity for public service. There is always something of interest to claim your attention. The work is varied enough never to become monstrous. The telephone, rural delivery and parcel post have brought the best of what the city can offer right to her doors. She is no longer shut away, in a mountain fastness as it were, but is part and parcel of the great throbbing outside world -a very active and progressive part, for her variety of employments requires that she keep all her faculties alive. She has some outdoor work and some indoor work, some bargaining and some bookkeeping, and it all resolves itself into a problem of efficiency how best to manage so as to gain most at the least expenditure of time With the advances and strength. made by science and the practical application of even the fundamental principles of science, there will no longer be any such things as drudges on our farms.

THE LIFE OF ONE GIRL ON THE FARM.

By JESSICA D. LYMAN, '13.

It was on a farm just eight miles from town that Virginia grew and developed into womanhood. As a child she had been delicate, but the fresh pure air of the country and the small tasks with which she started, strengthened her day by day, and she steadily grew stronger, until sick days soon became a thing of the past.

Being born an aristocrat, she was very proud in many respects, proud because she was a daughter of a tiller of the soil and because "blueblood" ran in her veins. She loved every inch of the big farm as well as every living animal and growing plant on it. She must be owner of a pig and possibly a calf when she was but a tiny girl. Town had no alluring temptations for her.

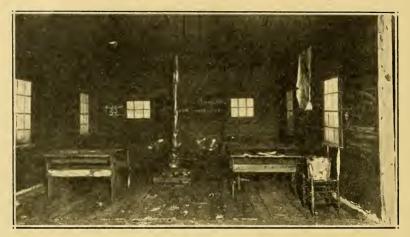
By the time she was fifteen years of age she conceived the idea of being self-supporting and commenced by making molasses maple syrup. Gradually she bought stock with the money made, a cow, pigs, chickens, and she persuaded her father to give her a colt. Not being afraid of work she tended diligently to her stock. Furthermore, she learned to work in the field, doing anything from cutting hay to pitching it in the barn. In fact, I have heard her say that the only thing she had not done in the field, was plowing.

The working side, however, was not all in Virginia's life. There was the social side, which is the eternal country problem. In the community was a very progressive and neighborly family. The mother believed in good, wholesome, social pleasures and advantages for her children, consequently she organized a club and gave the children one of her outhouses for a club-house. They met every week, read good literature, sang songs, gave parties and plays. Altogether the club was very successful and is to be well recommended for any country community.

Is it any wonder that she loved the farm? Is it a wonder she said the city cramped and suffocated her?

Still the farm and the club were not all, there was the church and the home. She took an active part in church work, and learned to do efficiently the things that every girl must know how to do, and she also came to dear old University of Tennessee for two weeks one winter and took a domestic science course, which she applied at home with much profit and interest.

So it would appear that girls on the farm have as great a chance with every possibility of a greater chance for development into the most broadly educated and noblest women of the land. To be close to nature is an inspiration alone and the fourfold aspect in education; mental, moral, physical, religious, may easily be realized here.



COMPARISON OF OLD SCHOOL HOUSE AND SAME SCHOOL HOUSE REMODELED

Winthrop College Rural School Exhibit at the Fifth National Corn Show at Columbia, S. C.

Old School House:

No cloak or hat closet.

The old original building is 28x24x13 feet.

New School House:

Hat and cloak closet for each sex. In remodeling, added 16 feet; outside measurement —44x24x13, making kitchen and workroom each 12x12 x13, leaving class-room 32x24x13.

Walls.

Rudely ceiled and covered with marks.

Dirty, where heads and hands come.

Plastered and tinted a restful shade. Ceiling lighter than walls. Perfectly clean.

Bare, with the exception of gayly tinted calendar.

Suitable pictures-well arranged.

Floors.

Rough, dirty, unsanitary. Not easily cleaned.

Cracks allow air to pour in on pupils' feet.

Smooth, matched flooring, stained and oiled.

Easily cleaned. No dust.

Ventilation.

Proportion of air space to pupils, not sufficient.

Windows small, unscreened. Not arranged on weights; therefore room cannot be ventilated when room is in use.

Old gassy stove.

Good proportion of air space to pupils.

Windows, large, screened, and on weights. Room can be ventilated while in use.

Ventilating stove removes foul air.



Lighting.

Windows on all sides. Children have to face light. Makes headaches and poor eyes.

Small panes of glass. Some broken, others soiled and stained.

No plants in windows.

Windows banked on left. Light falls over left shoulder.

Large panes. All entire and clean.

Growing plants in windows.

Heating.

Rude, rusty stove, no dampers. Heats room unevenly.

Placed in center of room—in the way of pupils.

Unsightly pipe.

Placed in box of dirty sand, used as spittoon at public meetings and as wastebasket by pupils.

No woodbox-untidy.

No ventilation.

Large, well-regulated stove. Jacketed, heats room evenly.

Placed on one side out of pupils' way.

Pipe neat and not conspicuous.

Ventilated heater. Seating.

Coal scrittle.

Double desks, unsanitary; two children sit together.

High seat with low desk; feet do not touch the floor. Low seat with high desk—pupil uncomfortable and connot use desk for writing, etc.

Pupil kept in one position.

Floor cannot be cleaned easily.

Can be used only as desks.

Single tables and chairs. One child at a table.

Table and chair in proportion to each other and to the pupils who use them. The objection that there will be more noise is met by the fact that rubber tips may be put on table legs, again and boys and girls are permitted to work off their surplus energy in agriculture, normal training and cooking, and not forced to unnatural self-control.

THE FIFTH NATIONAL CORN SHOW.

By J. C. PRIDMORE, Professor of Agronomy.

The Fifth National Corn Show, held in Columbia, S. C., from Jan. 27 to Feb. 14, was by far the biggest agricultural educational exposition ever held in the South and probably the best ever held in the country. Many people had a rather vague, indefinite idea as to the scope and nature of the exposition, thinking of course that it was a corn show and' nothing more. This, however, was not the case. There were many factors combined to make the show more educational, broader in its instruction than a mere pile of corn could have been.

One factor which went a long way towards making the show a great educational institution was the exhibit from twenty-seven of the college and State Experiment Stations of the United States. These states had their own station men in charge of their exhibits, and of course those charge could explain in detail, features of the work. Each station however, had represented in graphic form, the results of the thought and the efforts of their station men. Here it was easy for the practical man with no technical training to get a lesson that could be put into practice after returning from the show. The results of improvement along the lines of breeding and selection were the most important in this respect. Variety tests and fertilizer tests, for different soil types and conditions. Results of the work on plant diseases was also important, especially to those interested in cotton production.

Another factor which helped greatly in the educational feature of the show was the exhibit by the U. S. Department of Agriculture. This was broad in its nature, and besides teaching facts the exhibit showed in a way the scope of work that the Department has done and is doing today.

In addition to the above features there were school exhibits, community improvement exhibits, showing how rural sections may best be developed. Machinery of every kind, was there and in operation. Milking machines, modern dairies, and, in fact, everything that goes to make a "Farm Life Show" was there for study.

The corn itself, being that which had won at state fairs from which it had come, was naturally of a high-class. Indiana won the grand championship prize. Tennessee won first prize for the Southern zone. This was the first time that the show had ever been held in the South. It goes without saying, however, that the practical lessons learned there will go a long way towards increasing soil productiveness throughout the whole South.

LIFE HISTORY AND HABITS OF THE HONEY-BEE.

By J. E. RING, '16.

Spring will soon be here again and with it things around the bee hive take on new life. The bees begin "spring cleaning" and make preparations for another season's work.

There are many people who would like to raise bees and produce honey but they say they are afraid of the stings. To be sure bees do sting under some circumstances, but they do not go around, seeking whom they might sting all the time as many people think. A bee never voluntarily attacks any one at any distance from their home. They will sting when one does anything to their hive if he does not know how to prevent them. This is the method of procedure when you are going to open a hive to inspect or get the honey. First blow a few puffs of smoke in the entrance of the hive; wait a few minutes and do this again, then pry off the top and puff a little smoke over the frames to run the bees down a little. If these directions are followed scarcely a sting will be received. If one is received scrape it out with a knife or fingernail immediately and it will usually not hurt much. After a few stings one gets immuned to the poison and they do not cause much pain.

The proper time to handle bees is on a sunny day about noon, when most of the bees are in the field. They are always very cross on a rainy day.

The main trouble with those engaged in beekeeping is that they do not know the life history and habits of these wonderful insects. One

must know this before he can make a real success at beekeeping.

In a colony of bees there are distinct kinds of individuals; the queen, (there is only one queen in a colony), the males or drones, and the work-The queen is not merely the sovereign over the colony, but she is the mother of every bee in the hive and since this is so, great care should be taken in selecting the queen. She lays the eggs in the cells of the combs and these hatch into larvae and are fed by the workers and finally come out adult bees. The egg goes three days and then hatches into a larvae which remains in the cell and is fed 6 days, after which it is sealed up and goes into the pupa stage. It remains in this stage for 12 days and on the 21st day from the time that the egg was laid it comes out an adult bee. This is the way the worker bee develops. The queen takes only 16 days from the egg to the adult and the drone 24 days.

The first duty of the worker after she emerges from the cell is to commence to feed and care for the larvae or baby bees which are little worms at this stage of development. The workers are engaged in "household duties" for the first two weeks of their life. After this time the workers begin to go cut of the hive and investigate the outside world. Usually the first thing that the workers get is pollen ("bee bread"). This is what the little yellow pellets seen on the legs are. It is used to feed the baby bees. After a few trips

with pollen the worker begins to sip at the nectar (honey) found in the flowers and from now on devotes almost all her attention to this. If honey is very plentiful she works very hard and in about 5 or 6 weeks has about worn her wings out and so dies.

The life of the queen is quite different from that of the worker. She comes out of her cell on the 16th day after the egg has been laid. The first 4 or 5 days she spends in the hive going through it to see if she can find another queen. If she finds one they at once engage in a deadly combat. One is killed and the other remains to become the mother of the Between the 5th and 10th colony. day after birth, the queen makes her first appearance outside the hive. It is a very interesting sight to see a virgin queen first come out of the hive. She comes out and crawls around the entrance a little while. Then she flies off a foot or two and comes back, next she circles around her hive a few times and may not even take her bridal tour that day. This always takes place toward the middle of the day. If she does not take her wedding trip the first day, she comes out about the same time the next day and after fixing the location of her hive again, flies off and is soon lost to sight. On this flight she meets the drone on the wing and mating takes place. This always occurs in the open air and on wing, never in the hive. This has been seen by a few. The drone in separating from the queen leaves his generative organs attached to her and dies. On the second day after this occurs she usually starts laying. The queen bee is fertilized but once and lays for three years during the laying season. This is from about the middle of February to the middle of October, varying somewhat with the weather in this state. The heighth of the laying season comes during the latter half of April and through the month of May. good queen at this time will often lay as many as 3,000 to 4,000 eggs per day. It takes 21 days for these to hatch and so from about the first of May until the latter part of June there is a large number of bees hatching out daily. A great number die but not nearly so many as those coming on later. The result is that the hive soon becomes crowded unless it is very large and so the colony begins to make preparations for swarming during May and the early part of June, but may occur any time during the summer.

The first thing that the bees do is to built little thimble like cups of wax with the open end down, usually around the edges of the combs. These are about the size of a lead pencil on the inside. The queen lays in these and in about 8 or 10 days the young queens being sealed up, the old queen takes about half the bees and leaves to seek a new home. It is a very interesting sight to see them come rolling out headlong and fill the air. They fly around a few minutes and then settle in a cluster. From this cluster scouts go out in every direction in search of a home. The scouts are nearly always gone at least an hour and sometimes the swarm for some reason will remain clustered for two or three days. When a scout returns with the news of a home she flies around and around the cluster and the outside ones drop off and commence to circle around the cluster. Soon the entire cluster is in flight and then they set out straight for their new home.

The notion prevails that the queen is the leader of the swarm, but this is a mistake. She is scarcely ever the first bee out of the hive and simply joins in with the bunch.

If for any reason the queen fails to join the rest of the bees in the air, they usually do not cluster or if they do they remain so for only a short while and begin to look for the queen everywhere. If they find her out in the grass or anywhere, for that matter, they will cluster around her. If they fail to find her they return to the hive and wait until the first young queen hatches and then swarm with her. This is the method by which bees increase naturally. One hive sometimes swarms as many as 5 or 6 times in one year, but usually the first two swarms are the only ones that are any good.

After the swarm leaves, the parent colony is left with a young queen. She is usually laying on the tenth day after she hatches and in about 5 or 6 weeks the parent hive has built back to normal strength. So a col-

ony swarming in May or June is usually built up to normal strength by the middle or last part of July.

There are many races of bees but the ones most desirable and the one used by most up-to-date beekeepers is the Italian. They are gentle and great hustlers.

I have merely attempted to give the most important characteristics of the honey bee and anyone especially interested in beekeeping should get some good book treating this subject. For a beginner there is probably none better than Root's A B C and X Y Z of Bee Culture. Other excellent books on bees are: "How to Keep Bees' by Anna B. Comstock, Doctor Miller's "Fifty Years Among the Bees," Langstrath on "The Honey Bee," revised edition, and for one fairly well acquainted with bees, Doolittle's "Scientific Queen Rearing." All of these can be had from the A. F. Root Company, Medina, Ohio. Also one should send for some bee supply catalogues. The most prominent are: A. F. Root Co., Medina, O.; Fred W. Muth Co., Cincinnati, O., and W. T. Falconer Co., Falconer, N. Y.

STARTING THE ORCHARD.

By J. U. GILMORE, '15.

The primary question confronting the would-be fruit-grower is that of where he will plant his orchard. Fruit trees grow under a variety of conditions but there is always an ideal one. One must consider such factors as soil, site, location, kind of fruit to be grown, and markets that are to be supplied.

Apple trees grow best on rich clays

and well drained loams. Early maturing apples can be grown on sandy soil as they will ripen their fruit before the dry weather of summer affects their water supply. Late apples do best on heavy soils which retain moisture. However, if the soils are too rich a large woody growth of the tree is obtained at the expense of the future crops of fruit. We

should not expect, however, our bare elay hills to grow good, strong trees and perfect fruit because they are generally too poor. You must supply all deficiencies by fertilizers, as the nursery man does, or if you intend to commence correctly, prepare your land for an orehard by several years of soil-improvement and then plant your trees.

New land is extremely desirable for an orchard, especially cleared woodland as there is a large amount of humus in the soil and the natural content of fertilizing materials has not yet been depleted, yet we would recommend in this instance, the growing of a crop of potatoes or cowpeas for a year or so previous to planting the trees. Stony lands are not objectionable as they tend to prevent washing.

Everyone has not virgin land at his disposal; in such a case the richest soil should be used, whether naturally rich or artificially enriched by yourself through rotations. As an orchard occupies the land for many years a thorough preparation is necessary before the trees are planted. Old rich pastures may be cultivated one year and then the orchard may be planted. Unless the soil is loose and deep it would be advisable to dynamite the tree holes.

For the site of a commercial orchard consideration must be given to the surrounding conditions, such as the slope of the land, the direction it faces, and its nearness to a large body of water, high bluff or mountain as all these affect its future productiveness. The site of the home orchard is often predetermined and must be planted where there happens to be room for it.

Air drainage, as a preventive of late spring frosts, is sought for the commercial orchard. This is obtained by planting on the higher levels, with a valley or ravine near by for the colder heavy air to flow down into. Northern and eastern slopes are regarded as best for apple orchards since they warm up later in the spring and the fruit buds are kept in a dormant state. Fruit will ripen earlier on southern slopes and here it often has a better color than when grown on the north and east. late apples the southern exposure is especially suited as these apples need good color and a long growing season. Large bodies of water seem to prevent fluctuations in temperature besides giving the air more moisture.

With the location of a commercial orchard the first consideration is the facility of transportation. Two rival railroad or steamship lines are desirable. The distance from orchard to shipping point is an item to be considered. Many growers agree that three miles is the maximum distance for peaches, while apples may be hauled farther.

In the discussion of proper soil for the orchard we mentioned some points in the preparing of land for planting trees. In addition to these points, we would state that there is no great need of haste in planting the orchard; don't set the trees in any old fashion, but turn under crops of legumes and improve the land first by supplying humus and nitrogen to the soil. The plowing should be deep to allow sufficient root-development. Fall and spring plowing should both be done if a green manure crop has been grown.

In laying out the orchard the planter follows his own inclination, taking into consideration, nevertheless, the habit of the variety and the strength of the soil. With apples the distance varies from 20 to 50 feet. For commercial planting 30 feet is to be recommended. With pears the distance is somewhat less. Peaches are usually set 18 feet apart. "Alternate" or hexagonal planting allows more trees per acre than does "square" planting.

The inexperienced fruit grower hardly knows how to order his nursery stock. Successful growers assume that the one-year-old is more suitable than the two-year-old stock as the grower can head it as he desires.

Fruit trees can be set in late fall or in early spring. Both times have their advantages and in either case there must be top-pruning to correspond to the decreased root-system. Peach trees are cut back to a whip; apples to one-half, and pears, plums, and cherries are pruned to one-third the length of the tree.

The roots of trees should not be exposed to the air after shipping from the nursery. Heel in the trees immediately if they are not planted upon their arrival.

When planted the hole should be larger, not smaller, than the remaining root system. The tree must be set deeper than it grew in the nursery, by 1 to 2 inches. Broken roots should be pruned. The soil should be filled in tightly around the roots, and tramped as you entirely fill the hole. Throw an inch or so of loose dirt on top as a dust mulch.

While the orchard is being properly cared for by timely cultivation before it comes into bearing, such crops as corn, potatoes, strawberries. and melons may be profitably raised. The culture of these crops is intensive and requires frequent stiring of the soil which is precisely what the young trees need. Wood growth and large framework are to be promoted during the first few years of the life of an orchard, thus when it comes into bearing it will be handicapped in no manner for the plentiful production of luscious fruit.

EAR-TO-THE-ROW TEST.

By JAS. L. ROBINSON, '16.

Under present conditions of high values in real estate and increasing cost of production it is becoming not only desirable but necessary to secure increased yields. Unless this can be done the returns must soon fail to pay cost of production and interest on investment. As corn is one of our staple crops, in fact, our greatest crop, this question of increasing corn yields is of prime importance, and the factor that brings

the largest returns for the same of even a smaller outlay, is that of seed selection, and no one who hopes to get maximum crops can afford to go on producing corn without systematic selection of seed corn.

To secure best results this should be begun in August or September, by going through the field and marking the desirable ears which mature at the same time on stalks of as nearly as possible uniform type. This is

then gathered according to any plan by which these marked ears can be kept separate, from the rest of the crop. During the winter this corn should be carefully gone over, and the ears, which, on closer examination fail to meet the standard should be discarded. Then germination tests may profitably be conducted, and this time all ears whose kernels have a low vitality, removed. When this has been done the farmer has secured seed as good as he can expect for one year's work. This seems to be considerable trouble, but one intelligent man in four or five day's work distributed at the proper time can provide enough seed corn to pay for his time even at nominal prices for seed corn and the results will be much more satisfactory, than buying seed.

The really progressive farmer. however, is not willing to let his seed selection rest on a one year basis. It is for such persons that the Earto-the-row test offers opportunities. that are worth while in simple corn breeding. This begins where the selection and germination tests have left off. Some fifty to one hundred of the best ears that can be secured are chosen, and if this choice is made from corn that has been selected for seed by the above or by some other good plan, all the better. Part of the corn from each of these ears should be planted, that from each ear in a separate row. The ears and rows should be carefully numbered to correspond. The remaining portion of each ear should be carefully saved until the next year.

When the corn is mature it should be carefully harvested and the vield of each row measured and compared. Contrary to what we would naturally expect, these vields will vary greatly. The Iowa Experiment Station on one test of this kind secured yields ranging from 30 to 90 bushels per acre, while even greater variations have been recorded. The corn from the high-producing rows may be used for seed in the general corn field the next year, but is not the basis for the permanent seed, for this corn was very likely pollenated by that in a low-producing row, the returns from it would not measure up to its own production. To avoid this, we go back to the sample ears saved and pick out only those that produced a high yield, in the test rows. These are then planted again by rows, well removed from other corn and the crop raised this time furnishes the seed for the future. By beginning on these second test rows, as the selection was first made in the field a second improvement can be made, and this continued as long as desired. In conducting this test row breeding, the test plot should be removed as far as possible from other corn fields in order to prevent cross-pollenation. By continuing this system of breeding the yield can be greatly increased over that in the original field from which the first selection was made. should even reach that secured in the best of the test rows. Any corn grower who has sufficient ambition to plan for the future and the persistency to carry it out may well undertake the Ear-to-the-row Test.

POST TIMBER.

By H. E. BAKER, '15.

The various State Experiment Stations and farm journals are often asked: What is the most durable post timber?

The question is one of much importance to the farmers today. Timber is getting scarce and more and more posts are being used now than formerly. Many farmers are now buying posts and in many states plantations are being established for the purpose of growing post timber. If a man is buying posts, it is very important that he should know what kind of posts are worth most, what kind will last longest. Also, if a man is establishing a plantation, he should know what kind of timber will produce the best posts in the shortest time.

In order to get some idea of the relative durability of posts, an investigation was made by the Ohio Experiment Station. Fences were chosen which had been standing for a long time.

293 fences, containing 30,160 posts, were examined; in the states of Ohio, Indiana, Illinois, Kansas and Texas. They were taken in different states so as to get different ranges of climate.

By these experiments it was proven that osage orange (Bois d'arc) was by far the most durable post timber known. Locust stands second, red cedar, third; mulberry, fourth; white cedar, fifth; catalpa, sixth; chestnut, seventh; oak, eighth, and honey locust, sassafras, black walnut and white walnut are less durable timbers, sometimes used for posts.

Of course there are exceptions in

many cases. The posts of red cedar fences No. 2 and No. 26, of the fences examined, give a good illustration. Fence No. 26 was 62 years old and 82 per cent of the posts were sound. Fence No. 2 was 11 years old and only 74 per cent of the posts were sound. Upon examination, it was found that the posts in fence No. 2 had from 4 to 6 annual rings per inch, while those in Fence No. 26 had from 50 to 60 annual rings per inch. This shows very clearly that timber grown very rapidly is far less durable than that which has a very small annual growth. This rule applies to other kinds of timber as well as to the cedar.

One fence of Chinquapin oak posts was examined which was 23 years old. 90 per cent of the posts were sound. They were put into the ground the same day they were made.

Different kinds of soil have some effect on the durability of a post. In a stiff clay soil, a post will rot off just below the surface of the ground. In a porous soil, it will rot all the way down. In a low place where the ground is always wet, a post will last much longer than where the degree of moisture of the soil changes.

Posts made from trees only large enough to make one post from bark to center, should always have the heart split off, because rotting always begins in the heart. The heart may look sound but there are always small knots where limbs grew on the tree at some time. These knots cause decay to begin. A round post, made of osage orange, locust, or catalpa, will last well, because the out-

side wood protects the heart. A thin, flat post, made from the outer part of a tree, not including the sap, is more durable than a post made from any other part of the same grade of timber.

Then we may say: That a post is most durable made from a tree of very slow growth, with the heart split out (a flat one always being preferred); and that seasoning makes but little or no difference; and that the top end of the post, as it grew, should always be turned up, provided it is not the largest or soundest end.

The proposition of raising post tim-

ber might seem absurd to a man surrounded by timber. But in prairie countries the proposition is different. plantation serves as a windbreak to protect buildings crops and also produces the posts. There is a plantation of osage orange in Kansas which was established in 1878. In 1900 it was estimated, by agents of the forest service, to contain 2,640 first class, and 2,772 second class posts per acre, worth 121/2 and 7 cents each respectively. The total value would be \$524.04 per acre. The land could hardly have been in anything that would have payed better.

MARCH SPRAYING.

By H. A. POWERS, '13.

Now is the time to spray for San Jose Scale, after the foliage comes out little can be done to check or destroy this great enemy of the orchard.

The most effective and satisfactory remedy that can be used now is a solution of lime sulphur. It must be applied to the tree before the buds begin to burst.

There are several methods of preparing it. "Self-cooked" lime sulphur is rapidly gaining favor among orchardists. It is constituted as follows:

Flowers of	sulphur	10 lbs.
Stone lime		10 lbs.
Water		50 gal.

Weigh the lime into the barrel; then add a few gallons of water; sift in the sulphur; continue to add water until it has slaked the lime. Allow it to cook a few minutes. Put in enough water to make fifty gallons or the amount required to make the

proper proportion. It should now be cool.

The spraying should be done when there is little or no wind and the temperature above freezing. Every bit of infected surface must be wet in order to secure good results, since one female allowed to live would produce thousands by the end of next summer. Not only the tips of limbs but the trunks also should receive a thorough application. Just enough should be used but it should not run down the tree.

This spray causes painful irritations when it touches the flesh. The face may be protected by some oil or grease and the hands by water-proof gloves.

Kerosene emulsion and a great many patent preparations are used, but the one suggested gives about the same results and is cheaper than the manufactured ones. The former is best for fall spraying.

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Scientific; therefore practical

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WISH to thank the "co-eds" for their interesting contributions to the U. T. Farmer, and will appreciate articles from them in the future. An Agricultural College paper is incomplete until it apportions a certain space for the discussion of home economics, education, and the other subjects relating to the betterment of homes and rural society and improvement in the country woman's lot in life.

THE QUESTION of how to keep the girl on the farm is becoming as serious as that of how to keep the boy. The city is calling both. This call will prove irresistable to both until the boy is taught how to reduce drudgery and make money at farming and the girl is taught how to reduce the monotony and aimlessness of her life. It is the aim of the agricultural high schools of the state to

teach these things. With better education will come improvement in the third thing necessary to keep the young people in the country, namely, improvement in rural social life. Less drudgery and useless effort, more profit, more leisure and more "good times" with intellectual intercourse throughout the community is what we must strive for.

NTIL farming is universally profitable, rural life will not be a perfect success. Farming will be unprofitable so long as uneducated farmers with almost no working capital try to cultivate 3 acres of poor land with less than enough equipment needed for one, especially in localities with no shipping equipment and but poor roads. Although such a situation is not the rule, it is so common and so widespread as to

call forth the most earnest thought of the American people.

As remedies, education is first. This includes every educational institution from two hour visits of an agricultural train to a M. S. A. degree. With this will come better transportation. But of equal importance is sufficient capital. A man may know how to produce fine crops and how to raise the best livestock or how to build up and retain soil fertility, but these will avail him nothing if he has no capital or chance to borrow it.

Within less than one year a great movement has been started which will revolutionize the rural financial situation. No question of greater interest has arisen than that of rural credit. Starting on the hypothesis that farm land of increasing fertility is the safest security. Mr. Myrick, and leading bankers and business men in all parts of the country are attempting to show that plans can be devised by which farmers can borrow money at a lower rate for longer time. Would any such plans be safe? Would they improve the business habits of our farmers? Would they fit our conditions? How could

they be managed? For answer to these and scores of other questions pertaining to rural credit we must look to those European countries which have become famous for their rural credit systems. Every support should be given the committee that has been appointed to study these questions next summer.

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NATURE seems to have intended the Southern States to be the agricultural section of the country. She has given us the best distribution of rainfall, has lavished upon us sunshine, has deposited millions of tons of fertility in the vast beds of phosphatic rock, and mountains of limestone. She has abundantly provided us with all kinds of miner-

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The problems, in a nut-shell, may be considered as those of education and capital. Of course there are thousands of subordinate problems classed under one or both of the heads. Mr. Coulter, of the Census Bureau, says our tenancy system is responsible for this bad state of affairs. The "shifting tenant" being a rambler cares nothing for improvement of land, schools or community With present systems, live life. stock farming is impossible, hence soil improvement is impossible, which means continued low production and eventual poverty. He maintains that without a more stable tenancy system, or its equivalent, co-operation is impossible and co-operation is considered by many as the panacea for all our rural ills. Without a stable tenant, or land owner, and co-operation all attempts at improving rural finance through rural credit will fail. How is the tenancy system to be solved? By education of both landlord and tenant.

NEWS ITEMS ;__;__;__;__;__;__;__;__;__;__;__;

R. H. Felts, '12, spent a few days in town last month. Felts is now enSpringfield, Tenn. His visit here was to attend initiations of new members into the A. T. O. Fraternity and also Alpha Zeta.

A. S. Adsmond, '12, visited the Hill during the past week.

Several days ago Miss Catherine Mulligan lectured on home economics at a meeting in Mississippi.

Lee Morton, a former Ag. student, was here some days ago attending the initiation of A. T. O. pledges.

T. B. Mayfield, a former Ag. visited the Hill a short time ago. He is farming at Athens, Tenn.

Prof. S. H. Essary has just left for West Tennessee where he will start his experiments with blight resistant tomatoes.

Professor Willson spent several days in Middle Tennessee recently.

Professor Morgan has been Nashville and Jackson for several days.

A carload of instruction material including exhibits of live stock, seeds, feeds. fertilizers, pumps and various other things, has been prepared for use in the Farmers' Institute at Etowah, March 3rd to 8th, 1913. The ing members of the faculty will take part in the institute: Professor Morgan, Miss Mulligan, Miss Turner, Dr. Jacob and Professors Kepper, Willson, Pridmore, Moores and Bentley.

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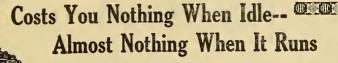
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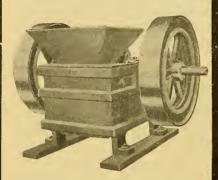
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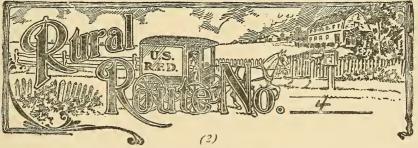
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Circular No. 7 of the Virginia Agricultural Experiment Station, March, 1910, speaking of San Jose scale, says, "The Lime-Sulfur Wash, either homemade or commercial, and the soluble oil sprays are the most satisfactory remedies for this pest. The soluble oil sprays, either home-made or commercial, are probably the best for treating the apple, because the oil spreads better on the downy twigs of the apple." "Scalecide" is the acknowledged leader of all soluble oils—the only one containing distinct fungicidal properties; standing the test for the past six years on all kinds of fruit trees. "Scalecide" has no substitute. There are other reasons. A postal request to Dept. A will bring you by return mail, free, our book, "Modern Methods of Harvesting, Grading and Packing Apples." and new booklet, "SCALECIDE, the Tree-Saver." If your dealer cannot supply you with "SCALECIDE" we will deliver it to any R. R. Station in the United States east of the Mississippi and north of the Ohio rivers on receipt of the price: 50-gal. bbls., \$25.00; 30-gal. bbls., \$16.00; 10-gal. cans, \$6.75; 5-gal. cans, \$3.75. Address B. G. PRATT CO, 50 Church Street, New York City.

Copy of a Page from Father's Letter



no rain in October and the wheat is small and does not look like it would stand the winter well.

We finished husking yesterday. From the acre where we tried your theory about bone-meal and clover making the Potash available, we harvested 50 bushels of rather chaffy corn, and from the rest of the field, where we used bone, clower and 50 lbs. Muriate of Potash per acre, we husked out 70 bushels per acre of tip-top corn that is nearly all fit to sell on the ear for seed corn.

corn that is nearly all fit to sell on the ear for seed corn.

I figure that a ton of Muricie of Potash on 40 acres of corn will pay for a year's post graduate study for you and leave you a little spare change to chip in

for athletics.

Mother and the girls are going to make a few days' visit to Aunt Sarah's

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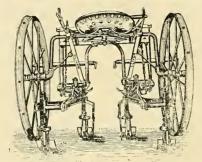
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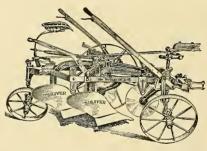
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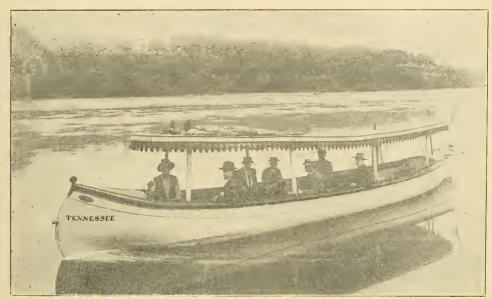
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View on Tennessee River, Near University of Tennessee

Vol. VII.

APRIL, 1913 Published Monthly by No. 7

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The Plow of God

If you listen you will hear, from east to west, Growing sounds of discontent and deep unrest. It is just the progress-driven plow of God, Tearing up the well-worn, custom-bounded sod, Shaping out each old tradition-trodden track Into furrows—fertile furrows, rich and black. Oh, what harvest they will yield When they widen to a field!

They will widen, they will broaden day by day,
As the progress-driven plow keeps on its way.
It will riddle all the ancient roads that lead
Into palaces of selfishness and greed.
It will tear away the alms house and the slum,
That the little homes and garden plats may come.
Yes, the garden green and sweet
Shall replace the stony street.

Let the wise man hear the menace that is blent
In this ever-growing sound of discontent.
Let him hear the rising clamor of the race
That the few shall yield the many larger space;
For the crucial hour is coming when the soil
Must be given to, or taken back, by toil.
Oh, that mighty plow of God—
Hear it breaking through the sod.

-Ella Wheeler Wilcox.

HESSIAN FLY

By P. P. HITE, '13

The original home of the Hessian fly is not known, it is generally believed that it was introduced into the United States by the Hessian soldiers during the Revolution. It is most probable that it was transported in the "flaxseed" stage in the straw used for bedding and other purposes by the soldiers, and thus obtained a foothold in Long Island about 1776. And from this locality it has spread at the rate of about 20 miles a year until now it occupies the wheat growing region of the United States south of the 45th degree latitude and east of the 100th degree longitude.

Life History

The adult Hessian fly deposits a large number of her eggs in the furrows on the upper side of the lower leaves of the plant. The eggs hatch in about four days and the young larvae crawl down the leaf to the sheath and between the sheath and stalk nearly to the base of the culm and there they feed. The larvae remains here and feed until grown, which usually takes about three weeks. The larva now shortens and shrinks away from its old skin which now forms a puparium or "flaxseed" within which the larva remains in a quiescent stage for a varying length of time, depending upon climatic condition. It seems that moisture is necessary for further development. conditions are right this larva ultimately changes into a pupa within the puparium. When the conditions are favorable the pupa forces off the end of the puparium and works its way out and up the sheath to the opening and the adult emerges.

The number of broods each year vary from two to four, under normal conditions there are only three, but under favorable climatic conditions such as unusually damp season, the insect's development is so hastened that there may be four broods, while dry, unfavorable season will retard their development to such an extent as to allow the emergence of only two broods. It is of the utmost importance that the cultivator understand the factors controlling these variations in order that he may control them.

Under normal climatic conditions the adult Hessian fly will appear in October and will soon deposit her eggs on the young fall wheat. At the approach of cold weather the larvae will have reached the puparium or "flaxseed" stage, and in this stage will hibernate over winter, and in the early spring change to pupae and emerge as adults about the first of April. These adults will now deposit eggs on wheat and will mature adults about the last of May. These flies will deposit eggs on spring wheat and will reach the "flaxseed" stage be fore harvest, in which condition they will remain until fall, when adult flies will appear.

Habits.

The adults of the Hessian fly have two well developed wings which enable them to fly about and spread over the neighborhood, thereby extending the distribution of the species; but it is doubtful if they travel in this way more than ten miles unless aided by the winds. Their adult life is ordinarily of very short duration, lasting only long enough to enable them to mate and deposit their eggs. The distribution and spread of the species over long distance is, no doubt, usually attained by their transportation in the pupa stage in straw and chaff.

The Hessian fly attacks wheat, barley and rye, but has not yet been known to infect oats. The effect of the presence of this insect upon these plants is very characteristic and differs with the stages of development of the plant. In the fall the eggs are deposited upon the leaves of the young plant and the larvae as soon as hatched crawl down the leaf into the sheath. Here they cause an increased local growth at the base of the leaf and culm. The plant at first has a dark green color and the infested shoot later turns brown and then yellow. In the spring the plants being larger, three eggs are deposited on the lower leaves and the larvae, when hatched, crawl down the sheath to just about the first joint as a rule. Here they feed and so weaken the stalk that it bends over until the upper portion is horizontal.

The adult Hessian fly is a small, gnat-like, two-winged creature, about half as large as a common mosquito, which it resembles in form.

The natural enemies of this insect are very numerous. These parasites kill practically every year from fifty to ninety per cent of the Hessian flies before they reach maturity and in some years even more. Nevertheless, in spite of this great reduction by parasitic insects and also by unfavorable climatic conditions, these insects frequently become unduly numerous and consequently destructive.

Remedies and Controls.

The use of insecticides for the suppression of the Hessian fly is practically out of the question and recourse must therefore be had to preventive rather than remedial measures. From an entomological standpoint it is possible to avoid injury from the fly by very late seeding; but in average seasons the risk of winter injury to the wheat sown sufficiently late to avoid the fly appears to be quite as great as the risk from the fly.

Professor Webster, of the Bureau of Entomology, recommends the following dates for fall seeding: North Michigan, soon after 1st of September; southern Michigan and northern Ohio, after first week in October; Kentucky and Tennessee October 10 to 20; Georgia and South Carolina, October 25 to November 15th. The exact dates will also depend upon altitude as well as latitude. These dates are not exact for climatic conditions and may cause them to vary from one to two weeks.

Some experiment stations recommend the sowing of a small part of the crop early, for the purpose of drawing the main attack of the fly and then destroying them by deep plowing and thorough tillage. After this is done the main crop is sown.

Ohio State Bulletin No. 136 says that the more practical method of controlling the pest would seem to be, when danger from fly is apprehended, to sow a part of the crop at a moderately early date, then watch the plants closely for the minute reddish eggs of the fly. If none are found when the plants are ten to twelve days old, sow the remainder of the crop, but if the young plants are found to be considerably infested, wait another week before sowing.

Burning and plowing under the stubble is also used to hold insects in check. The latter method is most preferred. As soon as the crop is harvested, stubble should be plowed under as deep as possible and the field then rolled, so as to compact the soil and prevent the emergence of the flies that might develop under ground. If the weather continues very dry after harvest, the plowing under of stubble can be postponed, since as a rule the insect will not come out, but will remain dormant and those that come out will find the volunteer wheat on which to rear another brood and will perish without doing any harm.

FURNISHING THE FARM HOME

By ETHEL ACUFF, '13.

House furnishings do not exist for alone, but as a backthemselves ground for the people who live among them. Just as the gold is the setting of the precious stone, so is the home the setting for the family: it must be a credit to the husband and to the wife, and an educational environment for the children. House and contents should be an outgrowth of the tastes, habits and occupation of its owners. Since farm life in its best aspect is a synonym for breadth, generosity, simplicity, cleanliness, abundance of sun light, fresh air and good food, the beauty of nature, and freedom from stiff formality, the equipment of the house should express this breadth, beauty, and freedom of life.

In furnishing any house three main considerations should be taken into account, namely: health, suitability, and beauty, and if we keep in mind the law that "anything which is needful may be made beau-

tiful" our house will be neither storage rooms nor curio shops. Let us turn to nature as an example. There we find everything fitted to its purpose, the law of order obeyed and upon close examination we see every object fashioned with the utmost consistency with its functions. If our household furnishings can stand these tests, then they are of true value.

If we remember that the first effort of good housekeeping is to keep dirt out of the house and the second to get it out, it will appear that carpets are unsanitary. Good floors are now to be had easily and cheaply and if properly painted or finished with oil and wax they from the best foundation for tasteful and cleanly housekeeping. For the kitchen and in some cases for the dining room floor, nothing is so satisfactory as linoleum.

Patterns of any sort, whether in carpets, wall paper, china, or drap-

ery, must be very carefully used that they may not be more conspicuous than that which they decorate. The floor and wall are the bases of color scheme and decoration, and should be inconspicuous, soft, and indefinite in effect. Strong contrasts should always be avoided. If the climate is sunny and the room well lighted, the walls and floor may be dark and rich in effect; on the other hand if the climate is uncertain and cloudy or the room badly lighted, the effect should be light and gay. Color is the chief means of producing this result.

Walls play the most important part in the restfulness of a room. There are several things to be considered—perhaps first, the apparent size of the room. Light colors give the appearance of largeness, while the dark have the opposite effect. Vertical stripes make the room appear higher. The warm colors, red, yellow, and orange may be used to impart cheeriness to a cold room, while the cool colors should always be used in rooms on the south side of the house. The walls should ever remain as a back ground for all other things and in the rooms most used the colors should be the least irritating such as grayed greens or browns.

All furniture that is not actually built into or fastened to the wall and floor should be easily movable and easily cleaned. In selecting we should keep in mind these simple principles—1. Hygienic cleanliness; 2, the minimum labor for the housewife; 3 the comfort of those who are to use it.

WINTER CARE OF THE BROOD S OW

By G. E. SHELBY, '13.

The winter months are the most trying of the year on the brood sow. It is the one season of the year when she is entirely dependent on the farmer for existence. She must have proper shelter provided to protect her from the weather and all her ration supplied. Just how well these are furnished largely determines the success of the spring litter.

As to shelter this can be very easily supplied and at small expense. A good shelter should provide adequate protection from the weather and at the same time be easily kept in a sanitary condition. The best and cheapest way to supply this shelter is by building small houses or cabins on runners and of a size that will accommodate three sows. This sys-

tem of cots or cabins has several advantages over the central hog house for the Southern States. First, they are much cheaper and easier to construct; second, they easily adapt themselves to any conditions that may arise on the hog farm: If disease should break out they can be easily disinfected or destroyed at small expense or loss. They can be easily moved from place to place and thus lessen the work of keeping in a sanitary condition, or in a pasture rotation as should be followed with hogs in the South they can be readily moved from field to field.

The food supply of the brood sow during the winter is the most important matter to consider. During the spring and summer months this is not so important, for if pastures are provided she can select practically all her food. But during the winter she is largely dependent on the corn crib. This should not be the case, for corn makes a very poor ration when fed alone to any breeding stock and especially to brood sows.

A ration for brood sows or any other breeding stock should contain the proper proportions of protein and fats a proper supply of mineral elements and be of sufficient bulk to properly distend the stomach and intestines. Corn is deficient in all these except the quantity of fat. All these deficiencies can be readily supplied by substituting for a part of the corn ration protein foods such as legume hays, linseed meal and mineral elements.

The lack of protein material can be supplied by feeding 1-2 lb. tankage or 1 lb. oil meal per day. This material can also be cheaply supplied by feeding plenty of the legume hays, such as alfalfa, red clover, cowpea or soybean, as a roughage, which will at the same time add sufficient bulk to the ration.

The mineral matter can be supplied by keeping a supply of wood ashes, charcoal, bone meal or finely ground raw rock phosphate before the hogs at all times. Deficiencies in protein and mineral matter can always be largely avoided in the ration by giving the sows free access to green pastures which can generally be supplied during the greater portion of the winter months.

MR. FARMER—YOUR DUTY

By H. P. OGDEN, '13.

Make a farmer out of that boy of yours, not simply to have some one to take the old farm off your hands when you have reached a ripe old age, and not to keep him away from the temptations of a sinful city in these times that try men's souls, not because he is too ignorant or stupid to do any thing else, but rather because there is money in it; there is a future for him in it; it is a big business which will call for the best in any man and will fully repay all thought, money and effort expended; and there is no life so completely blessed with a sentimental satisfaction as the farmer's life.

Don't begin by telling the boy all this. It would not impress him much. He sees little of profit in the gullied old farm where he has "chopped" corn from sun-up to sunset on a blistering July day and had to beg dad four days for a quarter to buy his sweetheart's box at the "box supper" at the school house Saturday night. Don't try to keep him on the farm by telling him that the city is a wicked, sinful place not fit for nice boys to live in. That would not be honest. Don't preach too much about the peace and joys of a simple life among the beautiful humming birds and honey bees and all the other innocent joys of a pastoral life.

Such arguments will not appeal to your red-blooded, ambitious boy. What does he care for peace and simplicity when every fibre is alive with a desire to win success in the cities where the conflict for power is at its highest, where wealth and fame are won by fighting and where his labor is rewarded by glory and fame. Certainly, he realizes and loves the wonderful and beautiful in nature perhaps much more clearly and truly than you do, but he is ashamed to show it lest people think him silly and sentimental.

Give him the chance to learn to read the wonderful stories taught by rock, and flower and stream. Try to answer his eternal "why" and also help him to answer it himself by closer observation and study of a few books of simple science. but above all, make him help you "figure out" vour own farm problems. Here is where you can interest him and flatter him by appealing to his judgment. He feels he is doing a man's work. Get him started to working out feeding rations, fertilizer mixture, rotations that will yield the greatest amount of digestible trients or greatest profits in dollars and cents. Let him find out for himself the possibilities in farming, the money he can make, the luxuries he can buy and the great things he can do on the old farm and for the neighborhood. Get him started and all the lawyers in the State could not persuade him to leave the farm. Only one person could, the attractive coed. he meets if he goes off to the city high school or college. If she is not a country girl or has not been taught to see the advantages and possibilities of a rural life she will certainly lead him off to concrete walks.

"It is up to you," Mr. Farmer, to improve the farming conditions of our State. Our State will never awake to its wonderful possibilities until you teach your boys and girls, your young men and young women, that farm life offers rewards as great

as does the city to those who understand it.

Don't lean back and say, "Oh, that's the teacher's business." We have not the teacher that can do it. They don't know any more about it than the children they teach. To be sure some try, but little can they do without your substantial support.

This question of good rural schools is a most vital question to you personally. In this matter in this state the counties with good rural high schools are gaining in population, material wealth and a better social life. Other counties, some of them with the richest soils, are losing in population, and wealth and there the social life is completely dead because of the best families moving to the counties with better schools. You are not doing your duty to your children unless you are working for better education. You are not working for the good of your own pocket-book or giving your children a chance unless you are eternally trying to get more and better schools in your county and community.

Furthermore, it is your business to improve the race. The cities will always look to you for the new blood. the strong arm and the clear brain to replace those consumed in its own strenuous life. Will you be able to supply this demand? Are the people the country is now sending to the cities a help or a hindrance to racial development? Once they were a great One hundred years ago the farmer was the foremost man of the nation in wealth, political influence and society. He was the aristocrat. Those were the "good old days" of our grand parents when to work was honorable. Then came the call of the

factory and the office. The more ambitious and energetic answered the call and for fifty years the emigration from the farm was astounding. Our best, strongest, and brightest fled to and built our wonderful cities. Never before in the world's history have we had the equal in development.

How has this continual emigration of her best done to the rural community? In answer ask yourself what would happen if you sell your best cattle for fifty years and keep the worst ones at home for breeders? Heredity is just as potent in man as any other animal and works according to identically the same laws. You can not expect to prevent your capable sons and daughters from going to the cities but you can make conditions more attractive for them to

keep more of the best ones in the country.

In developing the best breed of any animal, environment is just as important as heredity. No matter what inherent capabilities they are useless without the environment to develop them. The life of the improved farm home in the progressive, intellectual, cultured, rural neighborhood among the fields and woods where there is work and play, difficulties and successes is the ideal environment to develop to the highest the inherent possibilities of your children.

And you, Mr. Farmer, and your home life, are the most potent factors in making this environment ideal. Don't leave the work to some one less interested and less capable, but get to work now and make yours the ideal rural community.

FOOD ON THE FARM

By ROBERTA COWLES, '13

Someone has said, what the American people need is fuller skirts and fuller dinner pails. This is very true if we understand that it is not a greater amount of food that we need but more nutritious food.

When the idea of food on the farm presents itself to us we think of the "Old South" with its gracious hospitality, the well-to-do planter with his table fairly groaning beneath the weight of the many good things to eat. But the old South has passed, not its hospitality, nor its famous good things to eat, but the lavish expenditure of money and time on food, and we are trying to meet the demands of body nourishment in a more scientific and economical way. There must be a saving of time, money and health. To accom-

plish this the housewife must have definite ideas of composition of food and values of the various constituents; second, she must know the relation of food to the body, and; third, she must consider the occupations of the members of her household and prepare the food best suited to their needs.

The farmer is known as the honest tiller of the soil, why not be more honest in the matter of food on the farm. I mean with all the possibilities of growing the best animal and vegetable foods on the farm, why should the farm wife be ashamed of these foods and try to prepare the less desirable city folks' meal? Every one will agree with me that the most unsatisfactory meal to be had anywhere is a meal of canned

and prepared "city foods" served in the country. Why are people not more content with their own resources?

One reason that the country woman so quickly adopts the foods of her city sister is because of its more attractive appearance. She has not thought of making the things that grow on her own farm attractive. She has not thought of how appetizing she can make some of the dishes most common to her. After all, half the value of food is the pleasing way in which it is served. Food will not appeal to the appetite when it is carelessly prepared and served; and we know that when the appetite is not pleased, food is not properly digested no matter of how good quality it may be. Therefore I would appeal to the farmer's wife to know food values, to know the needs of her family, to use the foods which she can grow on her farm and to spend much time and thought in the preparation and attractive serving of the food.

THE VALUE OF FORAGE CROPS FOR HOGS. By GEO. B. ROBERTS, '14.

Repeated experiments have demonstrated that hog raising in the South can be made a profitable industry if forage crops are used in connection with concentrated feeds. Owing to the high price of corn and other grains at present, hog production with these feeds is not nearly so profitable as it was in years past when cheap grain feeds formed the principal ration.

The average results of the various experiments in the feeding of corn alone (dry lot feeding) show that it costs 5 cents per lb., live weight, to produce hogs when corn is fifty cents a bushel; 6 cents a pound when corn is 60 cents a bushel; that is, a bushel of corn will usually make 10 pounds of gain, when fed to thrifty hogs. But corn is not usually fed properly, and when raised on corn alone, hogs are seldom thrifty, hence the cost will often average much greater than this

Admitting that corn is one of the best grains for feeding hogs, if wisely used, it must also be noted that corn alone is not a perfect ration. The growing animal needs a certain amount of muscle forming material along with the fattening nutrients. The functions of protein are the production of lean meat, muscle, hair, tendon, and the building up and maintaining the vital organs of the body.

The carbohydrates and fats are used in the formation of fat, heat, and energy. Corn is rich in the latter compounds but is deficient in protein, and consequently the best results are not obtained when it is fed alone. Even when hogs are fairly well matured and are being fed a concentrated ration for fattening, it has been found that feeds richer in protein than corn give the best results.

Since it is generally conceded that the feeding of grains alone is an unwise and wasteful practice in swine production, many farmers are beginning to grow such forage crops as will enable them to produce more economical gains and at the same time improve their land. Professor Willson of the Tennessee Experiment Station says that he doesn't believe that there is a month in the year in Tennessee but what some crops can be pastured by hogs. In the late fall he would recommend wheat or barley, and in mid-winter Canada field peas and oats.

The kind of forage crop that is to be grown will vary according to soil and climatic conditions as well as to the type of farming one is to pursue. But when we consider the soils and climate of Tennessee, we are forced to admit that no State offers greater opportunity for a wider range of crops. If one is planning a hog farm, such crops will be grown as will furnish pasture the greater part of the year. Where a plan of this kind is followed a permanent pasture of alfalfa, Bermuda or blue grass should be maintained and in addition to this, wheat and hairy vetch, Canada field peas and oats, early rape and oats, and red or crimson clover may be grown for winter or spring grazing. For summer and fall grazing, sorghum, cowpeas, soybeans and Japan clover are used. Oftentimes a field of corn in which cowpeas are planted at the last cultivation is hogged off instead of gathering the corn in the usual way. Of course where a plan of this kind is to be followed, several adjoining lots will be necessary and a system of rotation ought to be followed.

The above plan may suggest a rath-

er intensive type of farming and one that is not often followed except where hog raising is a specialty. But it, nevertheless, suggests a possibility.

On the other hand, if hog raising is to be carried on in conjunction with other types of live stock farming it might be desirable—especially in the case of general purpose farming—to grow such crops as will furnish pasture and at the same time fit best into a certain rotation. A field of alfalfa will often furnish one or two cuttings for hay if it is not pastured too heavily.

Without discussing further the kinds of forage crops let us consider briefly their food value. At the Illinois Experiment Station it was found that by giving pigs access to a clover pasture in addition to ground corn, water and mineral matter during the first three months of a six months feeding period, they made 2.7 times as much gain, in live weight, as was made by the pigs that had ground corn, water and mineral matter, but no clover. Their conclusion was. since clover is a nitrogenous roughage and among other considerations furnishes protein, that it enabled the pigs in the above case to make much larger and also much more economical gains. The same might be said of alfalfa, soybeans, cowpeas, and other nitrogenous or leguminous crops. At the Missouri Experiment Station investigations show that after crediting grain fed to hogs, a field of alfalfa which was pastured 168 days gave a profit of \$35 per acre. Red clover pasture was valued at \$34 per acre.

Yet generally speaking several factors are to be considered when we estimate the value of any forage erop. Drought will often cut short a crop. Care must be taken not to

pasture too heavily. It must also be remembered that the best forage crop can not usually be expected to furnish more than a good maintenance ration, but as has been stated furnishes the largest and the most economical gains when used in connection with corn or other grains.

A NEW MAN IN THE LAND

C. C. FLANERY

The American farmer is coming to the front. This is not a startling message for he has been gaining ground for a half century or more in his slow but consistent way. He has not made the noise of the politician or the disturbance of the banker but he has been thinking and progressing, and as a result, we find he has made great progress during the last decade. This progress, however, has been due to the fertility of the soil rather than the intelligence of the farmer. Whatever the progress of the farmer has been, the public now demands a more scientific method of farming and a better rural life.

If the standards of farm and rural life are to be raised they must be accomplished by the county, backed by the authority of the State and nation, by means of able, practical, scientific men to carry the message directly to the farmer. We must give the schools credit for much of the work being done at present. Considering the means with which the ordinary school must get along, they are doing wonders. The schools, however, are training boys to be farmers but are not training farmers to be better farmers. The question of training farmers to be more scientific without interfering with their

work is a comparatively new problem and there are various ways being suggested by which this may be solved.

One scheme was suggested by vice-president-elect Marshall a few weeks ago. He recommended that each county in every State maintain a model scientific farm as an experimental station where the farmers of the county could come and get pointers and instruction. There are several reasons why this is not the best scheme. I believe that a demonstration farm is a fialure so far as giving instruction to farmers is concerned.

First, the farmers will not and can not observe its operations often enough and closely enough to obtain information commensurate with the trouble and expense of maintaining and visiting the farm. A few farmers may be benefitted, but it is impossible to conceive of all the farmers of a county visiting one farm for new ideas and then returning home and duplicate what they have seen.

Second, conditions are different on every farm. Not only is there a difference in the composition of the soil but there is a wide difference in the capital with which each farmer must farm. Farm practice can only be duplicated where conditions are similar or identical. This is never the case on any two farms.

Third, few demonstration farms are self-sustaining. This should be discouraging to any farmer to begin with. Do not misunderstand me, I do not mean that demonstration work is a failure, or that experimentation is a failure, but that a model farm conducted solely to teach farmers how to farm is out of the question.

I believe that the hope of the farmer and the practical and more scientific methods of farming as well as community improvement in general rests with "The New Man" that has come into the land. I mean the county demonstrator. There is a difference, however, between the county supervisor and the county demonstrator. The county supervisor is employed by the County Board of Education, and his work is to supervise agricultural education in the graded and high schools. He comes directly through the county to the schools in which case the county acts as a unit. On the other hand the county demonstrator is employed by the county through the agency of the county courts. One-half of the demonstrator's salary is paid by the county, the other half being paid by the government. He comes to the farmer through the United States Department of Co-operative Farm Demonstration Work, whose work is with the farmers rather than with the schools. He is a man clad with no authority to compel, but armed with a knowledge of good farm practices. He goes about his county counselling this farmer and that to reform his ways, to forsake his slipshod or unprofitable farm practices.

to instill the spirit of progress and to help him in the great movement for farm uplift. In rich counties he is provided with an automobile and a stenographer and also he has his headquarters in the County Court House from whence he goes out to visit different farms where his services will be useful. In counties of less wealth he goes on horseback or drives, but the principle is the same.

He must be a man full of good practical ideas, and it is his mission to so modify the farming of his county that he will have earned his salary and a great deal more. Some folks may think this to be a simple task but remember we have some wise farmers. Again, a county demonstrator must have a large store of knowledge in order to be able to advise all farmers about the methods of farming when some farmers have spent almost a lifetime studying their soil and better systems of farming. The county demonstrator has a tremendous task. He must be an agricultural scientist, vet filled with practical ideas and experience. He must know farm management not only on a plantation, but on a small farm with limited capital. He must be a preacher, an economist, an exhorter, a man of patience, faith, hope and kindling enthusiasm.

Are there such men available? Assuredly there are if we but hunt them. Of course we will have some fine looking men who will aspire to be county demonstrators, draw their pay and do nothing. This we must avoid. When we select a county demonstrator, let us get a man like I have described and when every county secures such a man farming will be revolutionized in the United States.

RELATION OF THE PHYSICAL PROPERTIES OF THE SOIL TO PLANT PRODUCTION.

F. W. FLEMING, '14.

Too many farmers do not fully appreciate the fact that there is a close relation between plant growth and the mechanical condition of the soil. The lack of appreciation is partially due, no doubt, to the neglect of the promoters of scientific agriculture to show in a practical way this relationship. Producing the proper physical conditions of the soil is a phase of soil management that is practically under the control of every farmer. That is to say, it is within his power. when he is familiar with soil conditions, to so influence the physical properties that fertility is greatly improved and crop production increased.

There is a general idea, however, that if a crop fails it is always due to conditions other than those of the soil. But as a matter of fact, air, moisture and temperature in the soil itself are as essential for crop production as any other considerations. And these factors are in the main controlled by the physical properties. These, in turn, can be controlled largely by the farmer. But, generally speaking, it is within the range of every farmer's practice to watch the physical actions of his own soil and modify it according to the needs of the desired crop.

Among the physical properties that greatly influence plant growth, four may be mentioned here: (1) Soil texture, (2) structure, (3) color, and (4) plasticity. The influence that these have directly on crop production is that they practically govern retention of water after it has reach-

ed the soil; they improve the mechanical condition of the soil to make it more readily permeable to roots; and permit easy aeration. The governing of these properties should, therefore, be uppermost in the mind of every farmer if he hopes to attain success.

Texture

In consideration of these with respect to their importance, possibly texture is of the greatest. It has reference to the size of the particles of which a soil is composed. particles vary in size; the grains forming a clay soil; the medium size grains, a silt loam; and the coarsest grains make up the sandy soils. Let us see in what way texture (size of the individual grains) may influence plant growth. A great many of us are vet not familiar with the total surface area of soil particles and its effect on capacity for retaining water. The smaller the size of the particles the greater the total surface area and thus the greater water holding capacity. This does not mean that the finer the particles the more fertile and tillable the land. for every farmer knows the difference in the tillage properties of clay and sand. He also knows that a clay soil will carry a crop through a much longer period of drought than will a sandy one, due to a greater amount of surface area exposed for the absorption and holding of water. It is often the case, however, that a soil is too fine to allow air and water to pass through freely. This can be improved on a limited area by modifying the texture with coarser particles, but under ordinary field conditions this is too expensive, so the farmer must select crops best adapted to his particular soil and aid in their growth by modifications of structure.

Structure

The structure deals with the arrangement or grouping of the particles of soil without reference to their size. There is no doubt but that this is one of the greatest influences in aiding plant development, and it is this property that tillage influences so greatly. There are two general arrangements of the soil particles: The separate grain structure and the granular structure. In the first, each of the soil particles is free and separate from the adjoining one, while in the second, a number of particles adhere forming a group. The granular condition of the soil is the one to be desired, since air can more readily pass through the soil than if each fine particle lies compactly against the Also the water holding capacity will be increased since the water is held in the soil so it exists as a thin film around each soil grain and if the soil grains are loosely floculated into groups there is more space between each grain and between the groups.

Warrington attributes this granulation to unequal expansion and contraction of the soil mass, due to the unequal imbibition and loss of water. This tension of the soil mass has a tendency to divide it along lines of weaknesses into groups of particles as the water escapes. Fortunately for the farmer there are several modifications of the structure that will increase this tendency. Those most

easily controlled by the farmer are: Tillage operations, development of plant roots, the addition of organic matter, and the use of lime. All are most effective with the fine grained soils.

Tillage has the greatest effect of all. If the soil is plowed too wet the masses are packed and become hard clods when dry. If plowed too dry a powdered or separate-grain structure is formed which is a condition unfavorable to the retention of water or circulation of air. So it remains that the farmer should by no means plow when the land is either too wet or too dry if he wishes to obtain a granular condition that is most favorable to plant growth in every respect so far as structure is concerned.

Plant roots effect structure by leaving the soil in a more porous condition after their decay. Humus has a wonderful granulating effect on clay soils and has a binding effect on sandy soils; the same is very true of lime and great benefit is derived from its use.

Color

Now we will see what effect the property of color has upon plant production. There are two coloring materials in the soil. iron compounds and humus. Humus gives a dark brown color while iron gives rise to a red, yellow, or gray Therefore the color of a color. soil varies according to the mixture of these two materials. Since the dark colored soils indicate the presence of organic matter and the light colored ones indicate the absence of it, the color of a soil is a pointer for the farmer as to its fertility. That is a dark brown soil is rich and the light one is poor. It is also a fact

that dark soil has a much greater power of absorbing heat from the sun's rays and thus the average temperature is appreciably raised.

Plasticity

Let us now consider the effects of plasticity. This property causes the soil particles to stick together under certain moisture conditions. It may be said that the finer the texture the greater the plasticity. In truth, plasticity is generally associated with the finer textured soils. This does not imply that it is entirely due to fine texture, for sand when wet will adhere, but upon drying it falls apart, whereas clay has a very great adhesive power even on drying. It is

this shrinkage, producing cracks and hardness, that may be injurious to roots and hinder their advancement. The plasticity of a clay soil may be influenced by lime. This causes the particles to stand out somewhat in a more fluffy condition and hence they do not adhere so strongly.

Thus we have considered the physical properties of the soil. And with these hints at their relation to plant production, it remains and is necessary that every farmer familiarizes himself with their action and importance by constant reading and practice. There is no doubt, then, that our agricultural conditions will be greatly improved and we will reap a richer harvest in the future.

FARM METHODS FOR THE CONTROL OF INSECTS.

G. B. THACKSTON, '14.

Since the time when the Pharaohs were visited by the locust plague, history has been filled with accounts of the depredations of insects and the enormous losses they have caused the tillers of the soil in all ages and countries. No country or nation has been excused from this menace.

It would appear at first as if, with the rapid advancement of agricultural methods, the enormous inroads that insects make on the farmer would be diminished. But we find this not to be the case, especially in the United States. Here the losses resulting from the depredations of insects on all plant products of the soil, both in their growing and in their stored state, together with those on live stock, exceed the entire expenditures of the National Government, including the pension

roll and the maintenance of the Army and Navy. This is a startling statement, but, nevertheless, it is true and shows us the need of immediate action. The general farmers over the country are the people who must be depended upon for the control of insects but the average farmer has neither the time nor the inclination to study the life-history of the many insects that prey upon his products and use individual treatment for each one, so it becomes necessary to use general methods that can be practiced by the greatest number of farmers and which, while not always entirely successful, aid a great deal in checking the work of the insects.

In fighting insects preventatives are far better than cures, for if we wait until they begin their work they can not be stopped until they have done injury. In controlling the insects of small crops, insecticides may be used but with the more staple crops, insecticides are almost impracticable and it becomes necessary to use general farm methods to hold them in check. The wise farmer will look ahead and plan his methods before the crop has been ruined. In preventing destruction by insects the following methods can easily be brought into use without seriously causing a drawback to the general farm work:

- 1. Crop Rotation.—A field that has been attacked by an insect doing serious damage to the crop should never grow the same crop two years in succession. For instance, the corn root worm feeds only on the roots of the corn plant and if the field is seeded to some other crop the corn root worm is starved out. It is a simple matter to grow clover, a small grain, or a grass, on this field following corn and the injury by the insect diminished if not entirely eliminated. The idea in this is, not to use in the rotation two crops that are closely related botanically, as the insects will feed on either or both of them. This method of insect control is probably the best that can be practiced by the average farmer. Not only is he able to combat with the insects but a rotation in almost every case will increase the crop produc-
- 2. Time of Planting—If one knows the habits of certain insects and the time at which they are most destructive to crops, then the time of planting can be so varied that the crop will avoid a part or all of the attack. This is seen in the attacks of the Hessian fly on wheat. Wheat

sown early will in nearly every case be practically ruined by the Hessian fly, while that sown late is injured very little if any at all.

- 3. Weeds.—Certain insects, in one stage, feed upon cultivated crops while in another stage they feed upon certain weeds. This factor is often of advantage in holding the insect under control, as in the case of the Southern tobacco worm, so common in the tobacco sections of Tennessee. The moth of this "worm" fondness for the flowers of the common jimson weed. In the tobacco sections this weed is allowed to grow around the edges of the tobacco fields and a syrup poisoned with cobalt is placed in the flowers, thus killing the moths that visit them before they can lay their eggs.
- 4. Clean Farming.—There is hardly a general farm crop but that a part of it is left in the field at harvesting. Insects injurious to a crop will remain in this refuse until frost, multiplying in great numbers. The only remedy for this is clean farming, either in the removal of all the rubbish by burning or else plowing under so deep that the insects are killed.
- 5. Plowing.—Many insects, while hibernating for the winter may be killed by late fall plowing. Early fall plowing will usually get those that do not hibernate until late while later plowing will break up the hibernating cells of those already wintering. Summer plowing is effective against many insects and early spring plowing will destroy many cutworms and grubs.

In conclusion, practice clean culture in everything. Cut the weeds in the fence corners that shelter scores of different insects, watch for

attacks and intercept them before great damage is done, and be always on the lookout. Let every farmer do his part toward stopping the destruc tions of insects so that their depredations will become smaller each year instead of larger.

CARE AND MANAGEMENT OF THE BROOD SOW

By J. L. HINSHAW, '13.

In considering this subject, perhaps it will be well to touch on the point of selection of the brood sow.

The pig that is intended for the use of brood sow should be of strong constitution and vitality, with long, deep body and extra good bone. A large number of teats is necessary in a good sow and to have them there must be plenty of length of body. This also gives more room for the development of the pigs before birth. Quality should be taken into consideration in the selection. Take the sow with the good smooth covering and medium size ear.

After the selection of the pig for the brood sow, the next step is to care for it in such a way as to properly develop it. Breeding stock should always be allowed to have the run of open pasture as much as possible. In habit the pig gathers its food from the surface of the ground or just below it and consumes more or less of earthy material. The herdsman should take this in consideration and furnish open, uncontaminated pasture.

The growing pig needs bone and muscle building food, good succulent pastures. Grass alone is not as good as rape and the legumes. Clover, alfalfa and soybeans are excellent feeds. In addition to these as pasturage a proper allowance of some food like oil meal, tankage or dairy products should be fed. Feed from

1-4 to 1-2 lb. of oil meal per head per day and about 1-2 as much tankage, or from one to one and a half quarts of skim milk or butter milk for the growing pig per day.

Do not over feed the growing pig. The feeder must exercise some judgment in feeding. A little observation will show whether too little or too much concentrates are being fed. The concentrates rich in protein should be fed with some carbohydrate feed like corn or barley. The pig should never be fed enough to cause it to become lazy.

In the Southern States where the winters are mild and pastures can be grown all the year, the winter care of the breeding stock is very much easier than in the North. Very inexpensive, portable shelters can be constructed that will give ample protection. The pigs should have plenty of exercise and not be allowed to become fat during the winter.

Brood sows of the larger breeds should reach a weight of at least 250 pounds by the time they are a year old.

The sow should be bred to farrow at the age of 12 to 16 months, if they are bred younger it is at a sacrifice of size and vigor of the sow. Sows that are thin in flesh should have their feed increased so as to be in good condition at farrowing time. They should not be too fat. Just

before farrowing time the feed should be of a laxative nature and of a limited amount. Good alfalfa hay or some good bean mash should be fed 2 or 3 days before farrowing. It might be good to give about 1-4 of a pound of Epsom Salts some two days before the sow is to farrow.

Some sows eat their pigs. This is due to poor care or abnormal feeding, for the sow is generally in a costive and feverish condition. such trouble occurs it is well to feed salt pork to the sow, or to sponge the pigs, as soon as dry, with a solution containing equal parts of the tincture of aloes and assafetida. The sow can not stand this mixture and will leave the pigs alone. The best and surest way to overcome the trouble, however, is to properly feed the sow with laxative foods of a coarse, bulky nature and see that she has plenty of exercise and especially see that the bowels move freely and that there is little fever at farrowing time.

The farrowing place should be made as comfortable as possible. The bed should not be deep, birds-nest like, as the pigs are likely to be crushed. neither should it be made of long straw as the pigs are likely to become entangled. Cut straw or leaves are satisfactory if they are free from dust. It is well to place

a board or scantling so that it will be about 8 inches from the floor and will stand out about the same distance from the walls, so that if the little pigs are back of the sow when she lies down they will not be crushed. If any of the pigs become chilled they may be revived by immersion in water that is as warm as the hand can bear, and then carefully drying. The sow should be handled in such a way as to be made gentle.

As the pigs grow, the strain on the sow becomes greater and the coarser feeds must be replaced with rich concentrates. Soybeans, cowpeas and linseed meal and tankage are very useful in connection with corn or barley. Skim milk is a very excellent food. Sows with large litters need to be fed most liberally.

When the pigs are 2 or 3 weeks old they should be encouraged to eat with their mother and the same food are alike good for both. Furnish them with a low flat trough. Dairy products, as skim milk and buttermilk are the best kind of feed for the young pigs. By the time the pigs are 8 weeks old they should be weaned and should weigh from 30 to 35 pounds.

The sow should be bred so as to farrow two litters a year, March and October being very good months to have the pigs come.

DUAL PURPOSE SHORTHORNS FOR TENNESSEE By GUY M. POWERS, '14.

The value of land in Tennessee, as elsewhere, has been rapidly increasing for the last decade. There are many large farmers in this State who can not profitably reach a milk market. The price of beef has reached a higher place in the market with

in the past two years. The supply of beef cattle from the west is not so great as it has been. The cost of living is gradually advancing and it seems impossible for the beef steer to decrease in price.

The question which arises with the

farmer is: What am I to do? I can not profitably run a dairy. A dairy cow will give plenty of milk, but her calves will have no sale except on the beef market and this would not pay, neither would the cow bring much if sold for beef.

After a thorough consideration of the subject he decides that the dual purpose cow is what he needs. The dual purpose cow is one which yields a profit at the milk pail and produces calves which may be profitably fed for beef. Statistics show that corn silage can be fed to dual purpose shorthorns with a nice profit as a result. Tennessee is a good corn producing State and any farmer could produce it all right. Then good pastures may be had in each section of the State. The land in West Tennessee is of a sandy nature and easily erodes; for this reason, if for no other, it should be kept covered as much as possible.

Cover crops may be used and they are removed in time to grow a good crop of Lespedeza (or Japan elover). Lespedeza, with Bermuda grass or alone, makes an excellent pasture, thrives well in this State, and will also prevent erosion to a wonderful extent. Lespedeza may also be successfully grown in both East and Middle Tennessee as a pasture and to prevent erosion. In the last two sections of Tennessee mentioned blue grass thrives well and its value as a pasture is known to all farmers.

England still retains the dual purpose shorthorn cows for milking purposes as well as for their beef qualities.

High class beef steers have been produced at the Iowa Experiment Station from dual purpose shorthorn cows that made from 350 to 400 pounds of butter per year.

The following information is gathered from the Breeder's Gazette:

A cow giving 4000 pounds of milk per year with a 3 1-2 per cent butter fat would yield 165 pounds of butter per year if all the milk were skimmed. The calf, though, will need the whole milk for about one month. This will bring about a decrease of 1070 and leave 150 pounds of butter. At 25 cents a pound this would bring \$37.50, which will pay for the cow's feed. The calf will need a little corn with a daily allowance of 20 pounds of skim milk, in addition to this the amount of hav. silage or grass will be rather small. When the calf is 5 or 6 months old it may be fed on grain and rough feed. There will be 1000 pounds or more of skim milk above the calf's requirements. This, with only 50 cent corn, is worth 25c per cwt. for pig feed. A cow will make 15 tons or more of manure per year, which is worth \$2.00 per ton or a total of \$30.00.

You can buy a good class of thin, square framed dry cows which will produce a good flow of milk for \$40 each or about calving time you may get them for \$50.00 to \$60.00 a head. This cow may be milked six or eight periods and fattened to weigh 1400 to 1500 pounds and be worth \$70.00 to \$90.00.

Estimates show that it costs about half as much to raise a calf on skim milk as on whole milk and it makes just as good a yearling. As high as land and feed are a cow will hardly pay by raising her calves only. The farmer should have his cream separator and feed the skim milk to

the calf and pigs then make butter of his cream. You can usually sell butter for 30 cents per pound.

The 4000 pound producing cow was first taken for an example to show that it paid to keep one with so low a milk flow. Now that you have the above information we will show you why Tennessee should use the dual purpose shorthorn. There are two types of shorthorns, namely, the beef type and the dual purpose type. We want to consider at this time only the dual purpose shorthorn.

Lula, of Missouri record, produced 12,341 pounds of milk, making 6056 pounds of butter in one year.

Rose of Glensdale 18075 pounds. Belle Clare 15215 pounds.

Then the average dual purpose shorthorn cow will produce from 5000 to 6000 pounds of milk per year with 3 1-2 per cent. butter fat. After she begins to exceed 6500 pounds, she is likely to lose some of her beef form. It is no trouble to get one to produce as high as 6500 pounds of

milk and at the same time produce good beef calves.

The shorthorns are the most widely distributed of the beef breeds. In size they are largest and the color may be pure red, pure white or an intermixture of white and red. Back is broad with strong loins and hind-quarters superior to any breed. In a bulletin issued by the Georgia State College of Agriculture we find it states that the shorthorn is the best milker of any of the beef breeds and also is unsurpassed for improving the common native stock.

We find that these cows bought at reasonable prices, which can be done, should make butter enough to pay for their feed and by feeding skim milk to the calf and pigs, the calf is a by-product besides the 15 tons manure. The above data shows that the dual purpose shorthorn is the cow for the Tennessee farmer who is not situated to market his milk and cream to an advantage and wishes to realize the most possible from his investment.

MEAT ON THE FARM JOE W. LOVELL, '16.

Of all persons the farmer should have the best table; he can raise almost everything it needs on his own farm. And yet there are farmers who do not even have a garden and who have to buy meat for their own use. There are other farmers who have plenty of meat but it is of poor quality on account of lack of skill in slaughtering and curing. But by proper selection of live animals for the block, by care in handling them before slaughtering, and by observing a few simple rules in slaughtering,

and curing, he may supply not only his family but also his neighbors with meat of excellent quality.

In selecting animals for food, healthfulness should be the first consideration. An animal may look nice and fat, and yet be diseased. There is a danger that the disease may be transmitted to those that eat the meat. Then flesh from diseased animals does not cure well. Bruises, broken limbs, or like accidents have a bad effect on the meat and unless the animal can be bled and dressed

immediately, it is best not to use it for food. First class meat can not be secured from animals that are poor and scrawny or losing flesh. They should be reasonably fat to give juiciness and flavor to the meat.

The age of the animal affects the quality of the meat, an old animal will naturally make tougher meat than young ones, but the flesh of very young animals is often lacking in flavor and is watery. Cattle are fit for beef at 18 to 20 months of age if properly fed, but the best meat is from animals 30 to 40 weeks old. calf should not be used for yeal under 6 weeks old and is best at about 10 weeks. Hogs may be used at any age after 6 weeks, but are most profitable about 8 to 12 months old. Sheep may be used after 2 or 3 months, but are best from 8 months to 2 years of age.

The best of care should be taken just before slaughtering. The animal should remain unfed for from 20 to 30 hours before killing. The object is to clean the system of food and facilitate bleeding, also if much food is left in the stomach it is very likely to taint the meat. Plenty of water should be given to aid in cleaning the system, and make it easier to drain the blood which will improve the color of the carcass.

After the animal is killed the carcass should be thoroughly cooled but not allowed to freeze. Especial care should be taken to keep it clean and out of reach of cats and dogs. The hams, shoulders, and bacon pieces from pork, and the cheaper cuts as the plate, shoulder and chuck ribs of beef are usually selected to cure. Mutton is generally used fresh.

There are two methods of curing meat that are commonly used, the brine process and dry curing. The brine process is the best for the farmer as it is less trouble than the dry cure since all that is required is to properly prepare the brine and pack the meat in it, requiring only a round vessel of some kind as a hardwood barrel or stone jar into which the meat is packed without waste space.

The following recipes are to be recommended for curing and pickling meat:

Corned Beef.—The plate, cross ribs and brisket are the pieces generally used; they should be cut into convenient sizes. Weigh the meat and allow for each 100 lbs. of meat, 10 lbs. of salt; sprinkle a layer of salt about one-fourth inch deep, then put a layer of meat followed by a layer of salt; continue this process until the barrel will hold only one layer more. Let stand over night and then add for each 100 lbs. of meat, 4 lbs. of sugar, 2 oz. of baking soda, 4 oz. saltpeter, dissolved in 1 gal. of boiling water. Cool and add 3 gal. of water which should be sufficient for this quantity of meat. A loose board cover weighted down should be put on to keep all of meat under surface. Keep in cool place for 20 or 30 days.

Sugar Cured Ham and Bacon.—When the meat is cooled rub each piece with salt and allow to drain over night. Then pack it in a barrel with the hams and shoulders in the bottom, using the strips of bacon to fill in between or put on top. For each 100 lbs of meat add 8 lbs. salt, 2 lbs. of brown sugar, and 2 oz. of saltpeter. Dissolve in 4 gal. of boiling water, and after cooling cover

meat with it. Bacon should remain in the brine 4 to 6 weeks; hams, 6 to 8 weeks.

Dried Beef .- The round steak is used for this and should be cut lengthwise of the grain. To each 100 lbs. of meat weigh out 5 lbs. of salt, 3 lbs. of granulated sugar and 2 oz. of saltpeter; mix thoroughly. Rub all pieces with a third of the mixture and pack very tightly into a jar. Let stand 3 days and remove and rub again, repack, putting the top piece on the bottom; after 3 days rub again with the remaining third: repack each time in the liquid formed in the jar. After 3 days it should be taken out and smoked and hung in a dry place where the water will evaporate from it.

It is desirable to smoke cured or pickled meat to close up the pores, keep out insects, and improve flavor. Hickory or some other hardwood is best to smoke meat with. When fire is kept going steadily and an even temperature is maintained, 24 to 36 hours is enough for one lot of meat.

Cooperative beef clubs are beginning to solve the question of fresh meat in the summer for farmers. Such a club is composed of about 20 or more families who organize a club to dispose of at least one beef a week. A sliding scale is used so that each receives a different piece each week until each member has had a whole carcass. A price per lb. is agreed upon and cash is paid for the meat. This money is used to buy the animal and to defray the other expenses.

THE U. T. FARMER

Scientific; therefore practical

Published Monthly by the Agricultural Club of the University of Tennessee.

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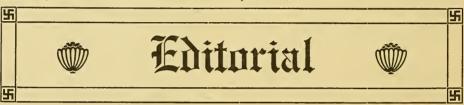
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PRIL, that busy month.—We will not take it to heart if the farmer neglects to read carefully this number of the U.T. Farmer because we know he is too busy during the day and too tired at night. Still we hope he will read a little. Perhaps it might be a recreation for him since we do not believe there is any really "deep stuff" here that will tax his tired mind. If he is a good farmer, he has already planned out his work and can well spare a few minutes to glance at out attempts. If he be a bad one, he has not subscribed and would not read it even if he had a chance to.

USINESS is business and pleasure **D** is pleasure, they tell us. This is generally true, but with the farmer business should be a pleasure. The farmer must thoroughly enjoy his work. There should be a certain joy in the life and sentiment about farm-

ing which has as real a value as the money made. People with lots of money say that there are many things in this world money will not buy; people who have very little say there are many more which cannot be bought without money. Because this is true the farmer must look just as carefully after the dollar as any other business man. The real basis should be commercial profit and mental or sentimental enjoyment.

VOULD a county demonstration farm be a successful means of educating farmers? What a fine question this would make for debate in your agricultural club. A good many people think it is not debatable—that all the argument is on one side. Others think all the arguments are on the other side until we are about ready to agree with Pat that "faith and be-gorry both sides or right."

The question is partially discussed in an article in this issue of the Farmer. Arguments are given which seem to show that the demonstration farm method is not the proper method for teaching good farming to those now farming. As logical as his arguments are, there are many ready to refute them with substantial arguments. The question cannot be settled with a word and we await with interest the experiments that are being made with this plan.

THE merchant or the manufacturer spends months in trying to find some way to increase his profits one or two precent. If he succeeds, he feels well paid for the time spent. The farmer hates to figure. He will not spare even one rainy day to study improved methods of farming even though his earnings might be, and often are, increased more than one hundred percent. He must be progressive or he is sure to fail and be forced to yield his place to the business farmer.

The business farmer is the one who is enough of a business man to be able and willing to make plans and test them as to their relative

profit or loss; he is enough of a scientist to propose to himself plans from which to select the one that is best adapted to his condition and will best improve his soil, his livestock, his crops; and he is enough of an artist to execute the plans he adopts or get others to do so for him. His qualifications are many and varied, they are much above those of the average farmer of today but yet are within the reach of every one to a greater or less degree. His success as a farmer in the future will be measured by these standards. Competition bound to increase; the man who can not or will not reduce his plans to a scientific or business basis must make way for the one who does.

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The Junior class in Horticulture, under the direction of Prof. C. A. Keffer, took a trip to Cranberry, N. C., where they spent a few days of tree-pruning.

The East Tennessee Teachers' Association met here March 20 and 21. Among the speakers were Professors Morgan and Hoskins and Miss Mulligan.

Professor Morgan has recently been offered some very important positions in other states, but it is hoped that his love for "The Old Volunteer" will keep him from leaving Tennessee.

A few weeks ago, the University and Experiment Station were visited by the Legislative Committee, who made a thorough inspection of these places. After leaving here the committee, accompanied by Professor Morgan, went to the West Tennessee Station at Jackson. They were well pleased with the work that is being done.

While visiting the University the guests were honored with a luncheon by Miss Katherine Mulligan.

Watch for the new motorcycle! Mr. Cotton is now enjoying his new 4-cylinder Henderson motorcycle and it certainly is a beauty.

The Senior Class in Dairy Research Work has been spending a great deal of time and labor in investigating the Market Milk Problems of Knoxville. The class has the co-operation of all the milk dealers and producers in and around the city, so the results of their work will probably be as accurate as could be gotten in any way. It is hoped that the class will soon be able to publish some data and information that will be of practical value to all. This work will be published in the U. T. Farmer as soon as completed.

At a meeting of the Agricultural Club, March 18, the following officers were elected:

President P. P. Hite
Vice-President Jehu Hinshaw
Sec.-Treas G. E. Shelby
Critic C. M. Haenseler
Sergeant K. A. Neely

At the same meeting the editor and business manager of the U. T. Farmer for 1914 were elected as follows:

The remainder of the staff will be appointed in the near future.

From March 20 to May 21, the Southern Railroad will run a Dairy Instruction Car through East Tennessee and Virginia. This car will stop at about fifty-three cities and towns, spending a whole day at most of the places. At each stop, lectures, illustrations and demonstrations will be given along practical dairy lines. The car will be in charge of Dr. C. M. Morgan, dairy agent of the Southern Railway. Among the expert dairy men who will give lectures will be Prof. C. A. Willson, animal husbandman of the University, Mr. T. D. Hardin and Mr. C. A. Hutton.

Professor Pridmore spent Easter vacation in West Tennessee.

Lbs.

Prof. C. A. Willson addressed the Tennessee Dairy Association, which held its meeting in Nashville recently.

The Jersey Cow, Elsie Marie 189475 owned by the Experiment Station, has just completed an official year test. She gave 7,203 lbs. of milk, with an average butter fat test of 5.5 per cent. This is equivalent to 461 lbs. butter.

The net profit for the year from this cow, with milk selling at \$2.25 per cwt., was \$95.30, or \$88.64 greater than the profit from the average Tennessee dairy cow.

Elsie Marie is the first station cow to be entered into the Official Register of Merit.

At the West Tennessee Experiment Station the following Holstein cows have been admitted to the Official Advanced Registry:

Lady Woodcrest Calantha Lad 136686, Lady Youngmaid Goodcrest Lad 135503, Viola Houwtji Lady 121618, Lady Valencia 4th's Natsey Lady 122230. The highest record was that of Viola Houwtji Lady, which was 20 lbs. butter in one week. This record was made with second calf. She indicates that at maturity she may give 25 to 30 lbs. butter in one week. This cow gave during her first period of lactation nearly 12,000 lbs. milk in one year. Had it been sold at \$2.25 per cwt. the gross returns for the year would have been \$270. Had it been retailed at 8c per quart, the returns would have been \$480.

The steer feeding experiments on the acre lots have just been completed for this year and as usual the Soybean acre ranked first.

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The results were as follows:

Acre

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1.	Soy Beans and Barley537
2.	Cowpeas and Barley532
3.	Corn and Barley291
4.	Soy Bean Hay and Barley392
5.	Soy Beans and Wheat436
6.	Sow Beans and Oats467
7.	Alfalfa 497

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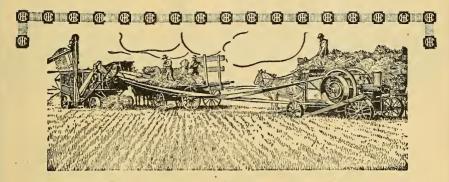


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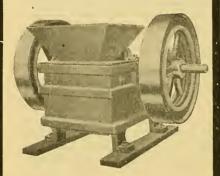
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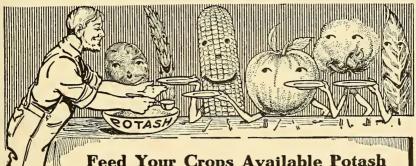
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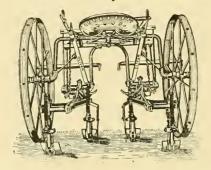
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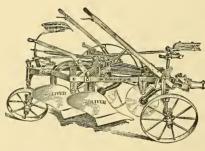
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Vol. VII.

MAY, 1913 Published Monthly by No. 8

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Pruning Young Orchard of Cranberry Iron Company.

THE U. T. FARMER

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A MILK SURVEY OF KNOXVILLE.—SUMMARY OF RESEARCH WORK DONE BY THE SENIOR DAIRY CLASS

By C. A. HUTTON, '13

How much milk is consumed in the city of Knoxville daily? What is the source of the milk and other dairy products? Is the supply equal to the How much of it is prodemand? duced from family cows within the city and suburbs? What per cent of it is produced on dairy farms? What is the relation of distance to market to the product sold? What, in general, are the sanitary conditions of the milk supply? What relation does the work of the City Board of Health bear to the sanitary and commercial qualities of the milk supply? What should be done to improve the milk supply? These are a few of the questions for which the Senior dairy class are seeking answers.

The work was begun in the fall of 1912 by three students of the Senior class: Messrs. Hinshaw, Hutton and Neely. Space here will permit of only a brief summary of the results of the work to date (April 15). Several local problems, not reported in this paper, have been worked out.

The first question taken up had to do with supply and demand. There is some complaint on the part of a few local dairymen to the effect that there is no market in Knoxville for dairy products, and the class wished to find out whether or not this complaint was well founded.

Since there are many families in the city and suburbs who keep their own cows, and as there was no reliable estimate obtainable as to either the number of such cows kept or their average production, it was necessary to make an actual count of the family cows. A careful survey of the entire city and suburbs resulted in the finding of a total of 888 milch cows. Very few of the family cows found could be classed as high producers. The majority could not go above the average for the state, viz, 3939 pounds of milk per year. The cows grazed during the summer season, or for about seven months each year, at which time about half of them are sold. Supposing that the family cows are equal in milk production to the average Tennessee cow, and that one-half of them are milked only 7 months each year, we have a total of 2,769,117 lbs., or 321,990 gal., as the total yearly production of the family cows, which is equivalent to 894 gal. daily.

In arriving at an estimate of the amount of milk and other dairy products sold in the city by local dairymen, the class endeavored to get the information at first hand. A list of all the dairymen was obtained from data in the office of the city Board of Health, and a letter was mailed to each of these dairymen requesting that they answer the questions on a stamped, addressed post-card, which was enclosed, and return same to the University. In return for this small favor, the class proposed to give the

dairymen the results of the investigation, but this work was all in vain, for out of the 231 cards sent out, only 44 were returned. One man (?) even had the audacity to return his card without filling it out or signing his name.

Again the class had free use of the records in office of the Board of Health, and from these records the following data were compiled, which are only approximate estimates:

Amounts Sold Daily—	GAL.
Milk, wholesale	1,993
Milk, retail	547
_	
Milk, wholesale and retail	2,540
Cream, wholesale and retail	50
	L _{BS} .
Butter, wholesale and retail	260

The amounts of the different products sold varies considerably during the different seasons of the year. Owing to the fact that most dairymen plan to have their cows freshen in the spring, the production is much heavier during the summer season than in the winter. Also the increased number of family cows kept during the grazing season tends to increase the total production during this season. This condition accounts largely for the fact that so many dairymen find it somewhat difficult to dispose of their products in the summer season. For these reasons dairymen do not receive as good prices during the summer as in winter. way, then, for the dairymen to secure better prices is to have their cows freshen in the fall and produce the greatest amount of first class products when the prices are highest.

The local supply of butter is not

sufficient to meet the market demands. especially during the winter season. One of the large retail grocery stores receives regular shipments from the Northern creameries, and in addition sells about 100 lbs. of oleomargarin daily. Another one of the large retail grocerymen said that he sold on an average of six hundred pounds butter each week. which comes from local dairies. (This amount is not included in the estimate could be obtained as to the from the Northern creameries does not sell as well as that produced by the local dairies, and that he could sell much more during the early fall and winter if he could get it.

From the figures given it will be seen that the supply of good dairy butter is not equal to the demand, and especially is this true during the winter. If we add the 894 gal, produced by the family cows to the 2,540 gal. produced by dairies, we have a total of 3,434 gal., as the total amount of milk consumed in Knoxville daily. The city and suburbs has a population of about 60,000. Hence, if the total milk supply were distributed equally among the 60,000 people, each person would receive only .05 gal. daily, or about 1 gill of milk. Where does the surplus come in?

The average prices received by the producers for the entire year are about as follows: Milk, wholesale, \$2 per cwt.; retail, 32c per gal. 20 per cent cream, \$1 per gal. Butter, 30c per lb. At these prices the total value of the dairy products sold by local dairymen is approximately \$128,000 per year. This does not include the value of buttermilk sold, as no reliable estimate above). He says that butter amount.

Sanitary Qualities of Dairy Products.

The writer has been informed by good authority that the milk supply of Knoxville is one of the best in the South as regards sanitary qualities and per cent of butter fat and total solids. However that may be, the City Board of Health is constantly looking after the production of market milk with a view to improving the sanitary conditions under which the milk is produced This work has been under way since 1908, and consists in the score card system of dairy inspection and the making of bacterial counts of Dairymen who sell market milk. their products in the city are required to secure a written permit from the Board of Health for which a fee of \$2 is charged, including a wagon tag. There has been considerable complaint on the part of some milk men who claim that this provision of the ordinance is unjust, and some have even refused to have their permits renewed.

The class undertook to investigate this matter and to find out just what results the Board of Health is accomplishing in improving the sanitary qualities of the city milk supply. The score card used is made up of five divisions, with a possible score of 100 as perfect or each division. Dairies which score 480 or over are classed as excellent: from 450 to 480 good; from 400 to 450, medium; and all under 400 are classed as poor; copies of each score are kept in the office of the Board of Health, and the writer, on behalf of the class, wishes to thank Dr. W. R. Cochrane and Miss Scott, office clerk, for free use of these records and for much assistance given us in collecting the data for this work.

The numerical form of dairy score

card has only been in use since March, 1908, and the results are tabulated in the following table.

YEAR	Total Number Dairies Scored	~	~	Good o. %	~	~ ~		Average Number Bacteria per C. C.
1910 1911 1912	14	0	0	4 40 3 21 3 49	10	72 1	7	245, 312 625, 012 528, 470

Comparing the results of the scores for the first year, 1910, with the results for the last year. 1912, we have a decrease of six per cent in the numbers of dairies ranking as excellent, an increase of 8 per cent in those ranking as good, an increase of 5 per cent in those ranking as medium, and a decrease of 7 per cent in the case of those ranking as poor. The results of the score card inspection show very little if any improvement, and the average bacterial count was more than twice as great in 1912 as in 1910.

In Geneva, N. Y., a similar system of dairy inspection is in use and the results secured there in the improvement of the milk supply have been very marked. At the beginning of the work in 1907, there were 37 per cent of the dairies in the poor class, 58 per cent were medium, and 5 per cent good, while there were none in the excellent class. At the end of one year all of the poor dairies had been eliminated, only 38 per cent were in the medium class, 58 per cent ranked as good, and nearly 4 per cent were classed as excellent. Similar improvements have resulted each year from the use of this system, as reported in Bulletin 337, N. Y. Experiment Station. Good results have also been secured in Richmond, Va., and in varions other cities, from the use of the score card system of dairy inspection.

The excellent results secured in Geneva are due to three chief factors not considered in the work in Knoxville. In the first place, the work there included a system of paying for the milk based upon quality as shown by the score of the dairy in which is was produced. Second, the results of each inspection were published and the consuming public could in this way find out the sanitary conditions under which the milk from each dairy was produced. Third, the work of inspection was done regularly every three months, so that the inspector could see that his suggestions for improvements were carried out.

We believe that if more money were given by the City Council of Knoxville to the support of this work so that the work of inspection and bacterial determination could be done at regular, frequent intervals, and that if the results of this work were made accessible to the public, that the milk supply could be greatly improved. Such a system of publicity would give the consumers more protection, and the producers of first class products would be benefited by the advertising, while the producers of insanitary products would be made public, and also advertised. The dairymen would thus be aided in the production of more sanitary products by the frequent suggestions of the expert who does the scoring, and those who produce a wholesome article could obtain better prices as a result of the advertising and consequent increased demand for their products. Those too insanitary in their methods and too careless to make the suggested improvements would gradually be put out of business, either by the ruling of the Board or by the competition of the more progressive dairymen. Many dairymen have the wrong conception of the work, thinking that the suggestions for improvement are too drastic and that too much is required of them. However, such is not the case, as the board does not require sudden and violent changes in the methods of careing for the milk, but does expect the dairyman to make gradual improvements.

It costs more to produce milk under sanitary conditions than in the ordinary way, and very little improvement can be hoped for until the producers are paid according to the quality of their milk. The two milk distributing plants which together handle about 2,000 gallons of milk daily, should institute a system of payment based on quality as indicated by the scores of the dairies and the bacterial counts.

Judging from the results secured in other cities, we believe the enforcement of such a system as here outlined would prove profitable to both producer and consumer.

DOMESTIC SCIENCE POSSIBILITIES IN THE ONE-ROOM SCHOOL By MARY SCOTT

Domestic Science may be added to the curriculum of the one-room school so as to serve the double purpose of teaching the principles of food preparation, and furnishing at least one hot dish each day, which, supplemented by the regular lunch brought from home, would give an appetizing and nutritious meal

The principles of preparation may be found in good cook books and the publications of the U. S. department of Agriculture which may be had for the asking. Such instruction should result in the more appetizing preparation of food in the homes of the pupils, and more economical living due to the use of left overs and the avoidance of waste in preparation.

In order that the pupils may enjoy a hot lunch as the result of the Domestic Science course, the parents must cooperate. A Mothers' Association might be organized for this purpose and be a benefit to the school in other ways as well. As very little or no money is usually allowed by the county for this work, the mothers could raise money for the equipment which would cost a little over \$20.00. Milk, vegetables and eggs could be sent from the various homes in turn.

A plate, cup and saucer, teaspoon, knife and fork brought from home by each child would give him a definite interest in the work, and teach him to bear his share in the improvement of the group.

The regular heating stove with two caps affords excellent opportunity for the cooking of vegetables and soups, and heating water and the hot plates for the fireless cooker.

When the weather is too warm for the heating stove, a three burner oil stove with an oven may be used, thus teaching the use of one of the greatest conveniences that the farmer's wife should have for hot weather cooking.

Instead of eating on the doorstep in company with the flies, each child may eat at his own desk. Paper napkins, costing \$1.00 per 1,000, may be used as plate doilies as well as napkins, thereby teaching the use and value of these.

In order to introduce Domestic Science in the one-room school the following equipment will be sufficient:

Heating Stove
Oil Stove with Oven\$8.00
Fireless Cooker 8.00
2 Dishpans
2 Granite Kettles
2 Tablespoons
1 Large Spoon
2 Paring Knives20
1 Spatula
1 Bread Knife
1 Large Tea Kettle
2 Salt Shakers
2 Pepper Shakers
1 Wooden Spoon
1 Large Mixing Bowl
2 Dishmops
1 Soap Shaker
6 Dish Towels
Total\$21.25

For keeping these utensils, a cupboard may be made from a goodsbox which has been painted and into which shelves have been fitted. Or an old cupboard repainted would serve.

TETANUS OR LOCKJAW

By H. M. COX

Tetanus is an acute, infectuous disease, due to the lockjaw bacillus, to which practically all domestic animals

are susceptible, and especially horses and mules.

The germ of lockjaw is a spore pro-

ducing organism, found in ordinary surface earth, and is especially prevalent in manure piles, and other unsanitary places about the barn yard. It has been said by a noted specialist, that the tiny organisms are found in every spoonful of surface dirt along the public highway. The germ gains entrance to the system by some wound or break in the skin of the animal.

Lockjaw is not a contagious disease. One attack with a recovery produces a permanent immunity.

The period of incubation, or the length of time required for the disease to develop, varies from three days to four weeks, but most frequently from nine to twenty-one days.

An animal, when infected, becomes unusually nervous and easily frightened, and when taken out of the stall appears rather stiff. He sweats freely when being worked, and the breathing becomes accelerated. The head and tail are carried unusually high and distended, due to muscular contraction. The animal has some difficulty in chewing, and a slight dribbling of saliva from the mouth can be noticed. The stiffness becomes more marked with time, the jaws become locked if the muscles of the

jaws are affected, and finally the animal dies, not from the locking of the jaws, as is generally supposed, but from asphyxia, which is brought about by the contraction of the muscles of the chest. Just before the animal dies, it breaks out in violent sweat, but there is no elevation of temperature.

Death usually results within ten days, but if the animal can be kept alive for thirteen or fourteen days, by proper treatment, it usually makes a recovery.

The best treatment of the disease is the preventive. The animal is vaccinated with a serum that has been made from the blood of an animal that has recovered from the disease. the preparation of this antitoxin, the system of the recovered animal is loaded up with the lockjaw bacillus, thereby making the blood more resistant. This vaccination produces only a temporary immunity, should be repeated as often as new wounds occur. In the treatment of the disease it is best, to open up the wounds thoroughly, and disinfect with some germ destroying solution such as equal parts of carbolic acid and iodine.

THE THIRD ANNUAL TRIP TO CRANBERRY, N. C.

By H. A. POWERS, '13

Professor Keffer, Doctor Porter and the Junior Horticulture class left Knoxville Thursday, March 20, for Cranberry, N. C. The class is composed of the following men: Hite, Flemming, Farris, Hume, Stone, Herron and H. Powers, but Herron was unable to make the trip on account of a recent illness.

In order to get the train that leaves Johnson City for Cranberry at 10:30 a. m., the class spent the night at the former place.

The railroad from Johnson City passes through a very interesting and picturesque country. Sycamore Shoals, where the heroes of King's Mountain gathered before the battle, are passed soon after leaving Johnson City. Some of the highest mountains east of the Mississippi River may be seen from the train. Among them is Roone

Mountain, the second highest peak in Appalachians. The railroad passes through the gorge of the Doe River, which is about fifteen miles in length. The track is located on the mountain side about fifty feet above the river bed. Great cliffs of rock rise abruptly above the road bed, from 300 to 500 feet, and even overhang in a few places. The masses of rock in some places are covered with scrubby plants; on others no trace of life is visible. Several tunnels are hewn through solid rock and are devoid of all masonry. Such scenery as this is seldom seen and people who have seen some of the best in the world declare that this is unsurpassed.

The party reached Cranberry in time for dinner on Good Friday. The afternoon and until Saturday 2 pm. was utilized for pruning and inspecting the orchards of Professor Keffer and the Cranberry Iron Co.

These orchards are situated on gentle slopes between two mountains. The Cranberry Iron Co. has about fifty acres and Professor Keffer about fifteen acres. The land is level enough to allow a spray pump to be easily drawn through it and to permit it to be thoroughly and easily cultivated. The elevation is about 3500 feet on the average. The trees are one year, and two years old. The soil seems to be fertile but is very rocky.

Fig. 1 shows Professor Keffer instructing a student in the art of pruning. This is just what was done and is not a pose for the kodak.

There is an iron mine located here which produces ore of a very high grade, and it has been worked for several years. The ore is located in beds which dip about 36 degrees. The



Fig. 1. Pruning a 2-year-old Orchard.

entrance is made on the level nearly perpendicular to the vein. The class visited these mines Saturday noon.

After all the work was finished Saturday afternoon, Doctor Porter, Professor Keffer, Humes, Hite and Powers took a hike towards the summit of Hump Mountain. The day was unusually fine for this on account of the clear atmosphere. clouds nor smoke were in the way. The view was interrupted only by great peaks and ranges. From the highest point reached, which about 200 feet from the summit, an unusually fine view was obtained. To the east Beech and Grandfather's Mountains stood out prominently. To the south thirteen successive ranges rose up, one after the other. Rarely does one find a day like this in mountains at this season of the year.

Sunday morning the entire party took a wagon drawn by two mules, over a rough mountain road, to inspect an orehard that is said never fails to bear fruit. The air was cold in the valley and it became colder as we ascended the mountain. About two miles of the trip was made on foot, because the road was too rough for the wagon. The orchard must have been 4,000 feet above sea level. The trees were high and slender, showing that thy were struggling to get more light. (See Fig. 2).

The orchard happened to be located on the side of Hump Mountain and several members of the party took a route back to Cranberry which led over the summit of the mountain. As we clamored upward we encountered clouds and a very hard, cold wind. The cold increased until we reached the top. Here a dense cloud obscured amost everything. The form of a person could be distinguished only a few yards. If one stood still, though he



Fig. 2. An Apple House in Orchard on Hump Mountain, N. C.

had an overcoat, he must seek shelter behind a boulder in order to be shielded from the wind. If it had not been so cloudy a fine view could have been obtained, but since there was only a short time remaining to get back to the hotel, eat Easter dinner, and catch the train for Johnson City, we could not wait for the clouds to blow over.

The valley was clear. In order to enjoy the scenery to the fullest extent the rear end of the train was converted into an observation car. Boxes and planks were used for seats. The trip through the gorge, already

described, presented a view not to be forgotten soon.

Doctor Porter made the trip to see and rest. He became very enthusiastic about the possibilities of waterdriven electrical appliances in this region.

The Party stopped at Cranberry Inn, an excellent house, managed by Mr. C. E. Linebeck. On account of the elevation, which is about 3,400 feet, nearness to good fishing and mountain scenery, this should make an ideal place for a summer vacation.

DUSTBy LOUISE W. FARRIS

Dust is fine particles of earth. It may be divided into two classes; the first class consists of the larger bodies of earth that can be readily seen indoors and out. The second class of fine particles can be seen only when strongly illuminated, their presence can be detected by the choking sensation when breathed into the lungs. This class is composed of the fine vegetables and animal fibres, as Broken particles of plants, pollen, hair and various kinds of micro-organisms as bacteria and mold spores.

These germs, as commonly called, are brought into the house by the feet, on the clothes, blown in through the windows and are also caused by careless living in the home. As an example the consumptive may prove fatal to other members of a family if the materials raised from the lungs are allowed to dry and float around in the air, instead of being burned.

One author has estimated that the open country air carries 2,000 dust particles to a cubic inch; in cities over 3,000,000 and ten times that many in inhabited rooms.

•So much for the dust; its kinds and dangers. We will now consider the ways in which it is collected. The first thing of importance is the unnecessary ornaments that are found in every home, on everyone's mantel, table and sideboard, especially, besides many other places. Why not remove all that are not useful or beautiful?

Carpets, upholstery of rough goods and heavy hangings are also good dust "catchers." Simpler draperies which can be easily removed and cleaned are much more economical and sanitary. Cotton and linen furnish the least expensive hangings. There are others such as chintzes, lawns, muslins, cretonnes, denims, madras, and hopsacking, that are very good. The turkey red and indigo blue are the most nearly "fast" in colored materials that you can find.

The furniture which is closely related with draperies should be considered in the problem of dust. It should have good lines, simplicity of construction, strength and appropriateness to make it useful as well as beautiful. If there is too much carving it is almost sure to be dusty all the time unless you stand over it with a dust cloth. All furniture should be dusted with a damp cloth and not on one side only. As you dust one spot fold in the cloth and use a clean side to dust the next and when it has no clean side put it in the pot and boil good before using again. many people will go over furniture using the same side the cloth all the time and when they have finished, will congratulate themselves on the good "job" they have done. Dusting should always be done with both the doors and windows open.

The most practical floor covering is hardwood floors with rugs that can be taken up and cleaned out of doors, but they are very dangerous where there are old people or children. In such cases, pine, hard or soft, maple, ash or oak, either oiled or painted, have proven to be very satisfactory. In case the floor covering is a carpet, it can be more easily cleaned without raising a dust by sprinkling with salt, or salt and bran, or moist

tea leaves, or other substances which keep the dust down. If the floors are oiled or painted, they can be cleaned with a damp cloth.

Where dust comes through the ventilation shaft in the home or large building, it can be prevented to a certain extent by the use of cheesecloth or thin cotton batting screens placed across the air currents near the entrance of the ventilation shaft.

A little thought on the part of every individual in a household would certainly improve the sanitary conditions of the places in which we spend most of our lives.

CARE OF THE DAIRY CALF

By C. M. HUME, '14.

"The eye of the master fatteneth his cattle," says an old German proverb. Applicable as the meaning of this proverb is to all branches of livestock farming, it is especially true of dairying. For success in this line of endeavor calls not only for a knowledge of its fundamental principles, the shrewdest of business ability, the mastery of numerous details, but, also for that indescribable quality, that something almost akin to love which must be felt by the herdsman towards his bovine charges.

While these principles can be applied to all phases of dairy work, the one in which they are most often neglected is that of calf raising. really constructive breeders have long since recognized the importance of this part of the work, but the average dairyman has sadly ignored it, not seeming to realize how much of their future success depends upon the treatment of the young animal. Yet no matter how well bred, no matter how well cared for when mature, if the calf is neglected progress in developing the herd is seriously hampered.

As with many other live stock questions, no set of rules can be laid down which will guarantee success. The personal element must always enter and be the controling factor. The plan outlined in this article comes from the experience of investigators

and the practice of the most successful dairymen.

Care must be taken, as soon as the dropped to prevent the development of white scours, one of the most fatal of calf diseases. This is best done bv painting the navel several times at intervals of a few hours with tincture of iodine. This prevents the entrance of the germs which cause the disease. One of the following preventatives should also be given in the milk or as a drench, one tablespoon from a solution of 1 oz. of formalin to 16 oz. of water, or the laundry starch treatment made in the following manner: take 1-2 tablespoons of laundry starch and boil, add 30-60 drops of laudanum, 2-4 well beaten eggs and 1-2 qts. of boiled sweet milk. This may be used as a cure as well as a preventative.

If the cow's udder is in good condition the calf may be taken away at the end of 24 hrs. although good practice varies here. For the next few days it should be fed its dam's milk 3 or 4 times a day. After this feed 8-10 lbs. of warm whole milk for two weeks, then gradually change to skimmilk, in the meantime giving a little grain to compensate for the fat removed from the milk.

Always feed the calf in a stanchion and feed the grain dry, after the milk has been taken. A mixture of corn and bran is good to start with. From now on feed all the grain the calf will clean up as gains may be made now at less expense than at any other time in the animal's life. A grain mixture of 1 part barley, 2 parts corn and 1 part oats, coarsely ground or whole, has given good results.

The calf may be weaned at 6 months of age, if necessary, although skimmilk can be fed to advantage for several months more. The grain given at weaning time must of course be increased, a good mixture being 3 parts corn, 2 of barley, 1 of soy beans

or 4 of corn, 2 of oats, 2 barley and 1 of soy beans. Good clover or alfalfa hay would be very helpful. The idea, which must be kept in mind, is to have the calf in a healthy growing condition at all times.

The milk buckets should be scalded every day, the pens and mangers clean and well aired. Do not feed too much milk and have it at about the same temperature each day. Give the calf individual attention and remember that "eternal vigilance is the price of success."

MARKETING FARM PRODUCE

By JESSE SHAVER, '15

How to market his crops to the best advantage is a problem in every farmer is interested. well-known fact that the farmer receives as his share only a small part of what the consumer pays the retailer for groceries. This is partly caused by the number of middlemen between producer and consumer; each of whom must of course make a liv-The different hands through which farm products must pass depends somewhat upon the nature of the product. Grain, in the grain section, is generally sold to the local elevator company; from which it passes into an elevator in some large grain center; this acts as a supply for all of the wholesalers in small towns, and they in turn supply the retailers, who sell to the consumer. In this case, the grain passes through four hands between producer and consumer.

Fruits, vegetables, and perishable goods only pass through two or three hands. They are generally shipped direct to the commission men who supply them to the retailer, from whom they reach the consumer. Thus this vital question narrows itself down to how to reduce the number of middlemen. A great deal has been done by the cooperative associations in securing better prices from the middlemen.

Unorganized farmers are more or less at the mercy of the commission merchants as to prices and grades of produce. Other advantages of cooperative associations are as follows:

I. It enables small producers to ship at carload rates. This may mean much to a small farmer.

II. The association, on account of the large amount of business it transacts may obtain more favorable freight rates than individuals.

III. Through frequent use of the telephone and telegraph, it may keep in close touch with all of the markets, and in that way avoid shipping produce to a glutted market; if necessary, they can re-route cars, already in transit, to a more favorable market.

IV. Associations secure uniformity in grading and packing and thereby obtain a better price for their farm products.

V. Packages, fertilizers, and other articles are obtained through the association at greatly reduced figures.

VI. The interchange of ideas through these meetings are of great help to the members. In this way unprofitable varieties of fruit and vegetables are weeded out.

VII. By an entire community getting together and growing the same thing, they may acquire a reputation for quality which will be valuable to them in dollars and cents. They may also be in a position to induce commission men to send agents to their station with instructions to purchase f. o. b. station; which has been found very profitable where tried. The records of the Osark Fruit Growers' Exchange of Arkansas may perhaps be of interest here. In one season, this exchange shipped 294 cars of strawberries to commission which averaged ninety cents a crate. Also, in the same season, 226 cars were sold on the track at an average of \$1.27 a crate, showing in this instance a clear profit of thirty-seven cents in favor of selling on the track. The next season they shipped to commission houses 272 cars, from which they received an average price of \$1.00 per crate; but for the 288 cars which they sold f. o. b. station, they received an average of \$1.66 or a clear profit of 66 cents a crate. feature of a cooperative association should not be overlooked.

Perhaps the best example of what a cooperative association can do if properly managed is the Hood River Association of the Pacific Northwest. At the time of its organization, apples from that section were bringing the farmers 85 cents. The association now includes one hundred members and controls 90 per cent of all fruit raised in this valley. In the first four years of its operation, it raised the price of Spitzenburgs from 85 cents to \$3.15 per box for the best grades and \$2.50 for Newtons. price, of course, ranged as regarded quality. As an experiment, in the fall of 1910, when apples were very plentiful and only bringing 85 cents here, they sent nine cars to England. After paying expenses, these netted the growers \$1.32 a box, thus giving them 47 cents profit for their adventure. These associations seek out new markets. Largely because of this association, the Hood River Valley has secured a reputation for apples of the highest quality and today Hood River apples bring fancy prices in New York. The great value of a cooperative association so far has been that as an organization it can deal advantageously with organized commission merchants and wholesalers. No association in the United States has so far been able to get along very long without the commission merchant. He seems to be a necessary evil. Yet in some places different methods have been tried with varying success. Perhaps the best of these, especially as regards perishable products, is that of sale by auction. Where thi shad been tried, part of the depot or a nearby building in the city you have chosen for your market, is as a room in which to conduct the auction. An auctioneer is put in charge of it and is notified when to expect consignments of produce. Then he advertises the auction very freely, taking care that the retail merchants and hucksters all know about it. When the time for the auction arrives, the goods are sold to the highest bidder on the ground, i. e., not delivered. Quality goods bring good prices; while the poorer grades are eagerly captured by the hucksters, who will buy almost anything if they can get it cheap enough. In this way nothing goes to waste and the goods are quickly converted into cash. Sometimes these auctions are

held at the car door. In some of the large cities in which this method was tried, auctions were held each morning at a fixed hour throughout the entire season. This method, so far, has not been very successful. Nevertheless, the problems of eliminating the middleman is very important. A closer connection between producer and consumer will help solve the problem of the high cost of living.

THE DRAFT MARE IN THE SOUTH

By L. C. PACE, '16

The right arm of the farmer is his faithful and efficient work animal; why not strengthen it and make it more useful?

The animal that pulls the plow, cultivator, and other farm implements must have strength, and weight is one essential of strength.

Tennessee is now opening her eyes to the fact that she needs more and better draft animals. Why not raise them?

Among the Southern States, Tennessee ranks among the first in raising horses for the track and show ring, but has never attempted to a great extent to raise draft horses and mules.

It has been the opinion heretofore that this climate is not suitable for raising draft horses, but the successful breeders of draft horses claim that a temperate climate is especially well suited for the growing of large animals and that a hot or cold climate checks the growth in the early stage of their life, the very time that the animal lays the foundation for its size. If it is once hindered in growth it will never regain the growth it lost

and make as large an animal as it would have if it had never been stunted.

Another reason why men do not raise draft animals in Tennessee is the fact that they think it costs more to raise a large animal than it does to raise a "plug." It does in one sense but in the long run it pays to raise good stock, that which the market demands.

The small mule is demanded in some sections, especially where mining or truck gardening is the chief industry, but if every one attempted to raise big mules there would be enough scrubs in the lot to fill the small mule market. The farm mule is different from the mine mule; it must be heavy, have a good capacity, and be able to do heavy work. Suppose a farmer had a mule to sell; it is very much harder for him to sell a little mule than it is for him to sell a good, large mule, no matter what price is asked for either one of them.

The farmer says that the large, heavy mule costs too much for him to buy, therefore, he has to keep the little ones and let someone else have

the good mules. If they cost too much, what is there then to be done? It is to raise them instead of raising the ones that are now being raised.

If one just stops and thinks for a moment he can figure out for himself that it is as cheap to raise good stock, the ones that there is a pleasure in having, as it is to raise just any kind. One can get a good grade mare that will weigh from 1400 to 1600 lbs. for \$300 or \$350 and a good deal less than that, but this is the maximum; she will raise a colt that will bring from \$200 to \$300 at 3 years of age. Now, take a mare that is worth \$150, this is the kind that is used mostly for raising mules in some parts of the states, what will her colt bring; at 3 About \$150. One vears of age? would not have to raise many colts to pay the difference in prices of mares. After you were even again, you would be able to make a nice profit off the good mares.

Another difference in colts would be in selling them. The first colt I mentioned, the good one, is what the market and the public are demanding; whereas the inferior one would be harder to sell because the market is always well supplied with this kind.

Heretofore, it has been argued that a large draft horse would not do well in the South, that they would not grow as large as they do up in the colder climates. It has also been argued that they would not breed. In some cases they have not bred well, but one of the reasons of this is that when some of the Northern breeders find out that a certain mare will not breed, they fix her up and ship her down South, and put her off on some of the farmers. But this time has about passed, the Southern farmer has

learned to look upon the Northern mare with suspicion and is therefore more careful when buying breeding animals.

Another cause of loss of interest and sometimes of disappointment and failure is over-enthusiasm in laying the foundation. There are two classes of men that illustrate this point. One are those who have neither judgment nor ready money, and mortgage their farms to buy some stock and soon lose their farms and The other class have their stock. cash, fair judgment and great zeal, but are young and inexperienced, and because they can not sell the produce from their stock as well as the man from whom they purchased their high class animals, they become discouraged and quit. Fortunately such men form a very small part of those who enter the live stock industry.

There has been several experiments tried on different breeds of draft horses in the South, and the Percheron seems to be the best adapted to the Southern farm and for raising mules in the South.

The Georgia College of Agriculture has recently purchased a pair of pure bred Percheron mares. These are probably the first registered mares to cross the border line of Georgia. The work of the grade mares which the college has been using for the past four years has been so satisfactory in every respect that it was deemed advisable to lay the foundation of a pure bred stud. In 1911 a registered stallion was purchased. Except during the breeding season he has been used regularly in farm work. These pure bred mares will also be used as farm workers. The farmer students and many farmers coming in contact with

the college have made a substantial beginning at replacing some of their mules with breeding mares and they have been well pleased with the change.

Formerly it was argued that big mares would not breed in the South, but the Georgia College has secured approximately a 70 per cent breeding record on their mares and this is by no means a low percentage. The above college used pure bred mares but for the average farmer a good grade mare would be as good for mule raising and would cost a good deal less.

The Tennessee Experiment Station has six good grade Percheron mares, which have been giving perfect satisfaction, both as breeders and as workers. There are numerous experiments other than those of the above stations, which prove conclusively that the draft animal is a success in the South.

The draft mare serves as a dual purpose animal on the farm. She does the work and also brings a colt that will give the owner a nice little profit on the side.

PROGRAM 40th ANNUAL MEETING EAST TENNESSEE FARMERS' CONVENTION AND INSTITUTE, MAY 20-21-22, 1913.

" A Larger Life on Better Farms."
GENERAL PROGRAM

FIRST DAY, TUESDAY, MAY 20.

Morning Session

10:30—Call to order by the president, W. B. Stokely, Dandridge.

Devotional exercises—Federation of Churches of Knoxville.

10:45—President's Address—W. B. Stokely.

11:15—Address—Hon. T. F. Peck, Commissioner of Agriculture, Nashville.

12:00—Appointment of committees. Announcements.

Afternoon Session

1:00—The Kind of Education that Will Help Solve Rural Problems—E. S. Richardson, College of Agriculture, Louisiana State University, Baton Rouge, La.; T. J. Coates, Rural School Inspector, Frankfort, Ky.

The Relation of Rural Education to the Farm—State Supt. Brister, Nashville.

The Relation of Rural Education to the Farm Home—Mrs. J. A. Reagan, President Home Makers' Section, Sweetwater.

3:00—Getting and Maintaining Stands of Clover and Grasses—C. A. Mooers, Tennessee Experiment Station.

Discussion.

4:30—The Convention's Method of Getting Red Clover (outline of method to be sent to interested delegates, and reports expected in 1914.)

5:30—Visit to Experiment Station Farm.

Evening Session

7:30—Short discussions by men and women of the farm on the following topics: Deep and Shallow Plowing; Liming; Rotations; Farm Poultry; Winter Cover Crops; Drainage; Proper Time to Apply Farmyard Manure; Economical Application of Fertilizers; High Production of Corn and Grains; Legumes in Building Soil; The Type of Live Stock for the Average Farm; Farmers' Cooperative Clubs; Home Conveniences; Silo Construction.

Second Day, Wednesday, May 21.

Morning Session
(Sectional Meetings)

Afternoon Session

1:00—Address — President W. W. Finley, of the Southern Railway Company, Washington, D. C.

2:00—Alfalfa Symposium—Joe E. Wing, Mechanicsburg, Ohio; P. G. Holden, Chicago, Ill.; O. P. R. Fox, Morristown; Geo. H. Pepper, Johnson City; J. W. Fisher, Newport, and the 250 farmers in East Tennessee growing alfalfa.

The Convention's method of getting alfalfa (outline of method to be sent to interested delegates, and report expected in 1914).

4:30—The Business of the Farmer—Clarendon Davis, Huntsville, Ala.

Discussion, led by Phil S. Taylor, Jonesboro, Tenn.

Evening Session

7:30—The Country Minister's Opportunity to Assist in the Solution of the Rural Problems—Rev. George R. Stuart, Knoxville.

8:00—Rural Life Conference—E. S. Richardson, T. J. Coates, Prof. Harry Clark, University of Tennessee; Miss Virginia P. Moore, Nashville, Tenn.

THIRD DAY, THURSDAY, MAY 22.

Morning Session
(Sectional Meetings)

Afternoon Session

1:00—Reports of committees and election of officers.

 $3:\!00\text{---Adjournment}.$

GENERAL FARM AND LIVE STOCK SECTION.

"A Silo on Every Farm."

FIRST DAY, TUESDAY, MAY 20.

(See General Program)

SECOND DAY, WEDNESDAY, MAY 21.

Morning Session

9:00—Common Diseases of Sheep and Cattle, and How to Control Them —Dr. Geo. R. White, state veterinarian, Department of Agriculture, Nashville.

Discussion.

10:00—Results of Recent Experiments in the Stall and Pasture Feeding of Beef Cattle. Prof. Dan. T. Gray, College of Agr., West Raleigh, N. C.

Discussion.

11:15—Tennessee's Feed and Seed Laws—A. L. Garrison, Chief Seed and Feed Inspector, Nashville.

Discussion.

Afternoon and Evening Sessions. (See General Program)

THIRD DAY, THURSDAY, MAY 22.

Morning Session

9:00—Horses and Mules: Address—Wayne Dinsmore, secretary Percheron Society of America, Chicago, Ill.

Experiences with Draft Mares.— Prof. Milton Jarnagin, College of Agriculture, Athens, Ga.

Discussion led by Garrick Shanks, Limestone.

10:30—Profitable Lamb Production in Tennessee—J. E. Hite, Gallatin.

11:00—Hog Pastures and Hoggingoff Crops—Prof. C. A. Willson, University of Tennessee; Dr. J. I. Huggins, Oak Grove.

> Afternoon Session (See General Program) DAIRY SECTION

"Up-to-date Dairies; Community Breeding; Cow-testing Associations." FIRST DAY, TUESDAY, MAY 20.

(See General Program)

Second Day, Wednesday, May 21.

Morning Session

9:00—Dairy Management, Dr. C.

M. Morgan, dairy agent, Southern Railway, Washington, D. C.

Discussion.

10:00—Cow Testing Associations—Helmer Rabild, dairy division, bureau of animal industry, U. S. Dept. of Agriculture, Washington, D. C.

Discussion.

11:00—Relation of Feed to Production to Dairy Cows.

Discussion. Prof. C. A. Willson.

Afternoon and Evening Sessions

(See General Program)

Third Day, Thursday, May 22.

Morning Session
9:00—Milk Production Per Acre—
C. A. Hutton, Friendsville.

9:45—How to Make a Cheap, Durable Silo—H. N. Camp, Jr., Knoxville. Discussion, led by J. N. Meroney.

10:30—Calves and Hogs as Dairy By-products—Chas. J. Beal, Rogers-ville; S. O. Montgomery, Greenback.

Afternoon Session

(See General Program)

HORTICULTURAL SECTION

"Abundance of Farm Fruit and Vegetables, Throughout the Year."

FIRST DAY, TUESDAY, MAY 20. (See General Program)

Second Day, Wednesday, May 21.

Morning Session

9:00—Waste of Large Farm Gardens—R. T. DeBerry, assistant commissioner of agriculture, Humboldt, Tenn.

Discussion, led by C. B. Flannery, Knoxville.

Sweet Potato: Culture and Storage —W. R. Hawk, President Madison County Truck Growers' Association, Jackson.

Tomato as a Canner's Crop—W. T. Moore, Cleveland.

Record of an Onion Crop—Frank Jarnagin, Jefferson City.

Asparagus—D. W. Hunter, Chattanooga.

Trucking as a Side-line in Farming
—S. R. Ogden, Concord.

Afternoon and Evening Sessions
(See General Program)

Third Day, Thursday, May 22.

Morning Session

(At the University Fruit Farm) 9:00—Summer-pruning the Peach —Prof. C. A. Keffer, University of Tennessee.

Demonstration of Orchard Spraying with Power and Hand-machines—Prof. G. M. Bentley, state entomologist and plant pathologist, Knoxville.

Afternoon Session

(See General Program)

HOME-MAKERS' SECTION

Our Motto: "We must have home-making taught in every public school."

FIRST DAY, TUESDAY, MAY 20.

(The ladies will join with the men in the general session the first day.) Second Day, Wednesday, May 21.

Morning Session

9:00—Opening Talk—Mrs. James A. Reagan, president.

Address—What is the Best Method of Getting Home-making in Public Schools and Rural Communities?—Miss Marie Willoughby, U. S. Dept. of Agriculture, Washington, D. C.

Discussion by members.

10:30—The Prevention of Disease Among Children—Dr. Olin West, Assistant Secretary State Board of Health, Nashville.

Lunch, served by Home Economics Department, University of Tennessee.

Afternoon and Evening Sessions

(See General Program)

THIRD DAY, THURSDAY, MAY 22.

Morning Session

9:00—The Minimum Equipment for

Teaching Home-making in Rural Districts—Miss Melissa Bird, Tasso, Tenn.

Discussion by members.

Labor-saving Devices for the Home
—Miss Louise Turner.

Discussion by the members.

BOYS' CORN CLUB SECTION

"Fewer Acres—More Corn to the Acre."

In charge of J. R. Fewell, State Corn Club Agent.

FIRST DAY, TUESDAY, MAY 20. (See General Program)

SECOND DAY, WEDNESDAY, MAY 21.

Morning Session

9:30—Address—J. R. Fewell, State Corn Club Agent, U. S. Dept. of Agriculture, Nashville.

10:15—Why the Corn Club Boys Should be Land Builders—Clarendon Davis, Huntsville, Ala.

11:00—How a Corn Club Boy Went to College—Prof. Harry Clark.

Afternoon Session

2:00—How to Increase the Yields of Corn—J. A. Dinwiddie, New Market.

2:30—Proper Cultivation of Corn—C. F. Striplin, district demonstration agent, U. S. Dept. Agriculture, Maryville.

3:00—Score-card Judging of Corn by the Boys—Prof. J. C. Pridmore, University of Tennessee, Knoxville.

3:30—Excursion over the Experiment Station Farm.

Evening Session
(See General Program)
THIRD DAY, THURSDAY, MAY 22.
(See General Program)

NEWS

The Junior class has been in a squabble at its meetings lately. Said squabble was raised over what shall be done to give the Seniors a pleasant farewell parting. The muss was finally settled when it was decided to take them to Neubert Springs for a supper and dance. The date has not been set.

Professors Hoskins and Rall have spent a few days visiting high schools of the state in behalf of the university.

Professor Pridmore was called from the University recently, by the death of his father-in-law. Mrs. Pridmore had been at home with her father for several weeks when his death occured. The many friends of Professor and Mrs. Pridmore heartily sympathize with them in their bereavement. The University was visited a few days ago by Professor Karapetoff of Cornell University. Professor Karapetoff was making a Southern tour of the leading universities where he delivered lectures on "The Development of the Personality." Being of a "combinational personality," he also gave piano recitals.

There is a great time coming for the farmers of East Tennessee. The East Tennessee Farmers' Convention will hold its annual meeting May 20-21-22 at the University Experiment Station. This convention has always been successful in bringing the farmers closer in touch with one another and keeping them up with the agricultural progress. We expect to see a large crowd in attendance.

Oh you circus day! All ye that are of a jovial nature and are looking forward with "funny" expectations,

prepare ye for that circus day. We are anxious to see what great, big stunt is pulled off by the Ag. Club.

On the 12th of last month Messrs. Heiskell and Buck defeated, in debate, Messrs. Ramey and Meachum of the University of Texas. Our boys affirmed the "Establishment of a National Reserve Association in the United States," while the Texans opposed it. The debate was held in the chapel of Science Hall. The same question was debated in Fayetteville, Arkansas by Messrs, McConnell and Farris and representatives of the University of Arkansas. McConnel and Farris opposed the establishment of the association and lost to Arkansas by a 1 to 2 vote.

What will it be? That is the question. The Ag. Club is going to begin a new precedent this year by an

entertainment of some kind near the close of the school days.

Professor Keffer's class in Junior Horticulture had a pleasant trip to Martel recently. They visited the orchard of Mrs. McNeely, who surprised them with a good "old fashioned" picnic dinner after a mornings pruning. An enjoyable day was spent as well as one of profit.

Our friend and "booster," John Titsworth, has just returned from Winchester, Tenn., where he has been negotiating with the Winchester School in regard to a position as teacher of agriculture and athletic director. This is one of the best preparatory schools in the state and it will, we believe, be materially helped if John is obtained. We are glad to see Professor Endsley starting the Agricultural Department in "Prep" schools. This is the first private school in the state to start such a movement.

THE U. T. FARMER

Scientific; therefore practical

Published Monthly by the Agricultural Club of the University of Tennessee.

H. P. Ogden, '13

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Advertising rates will be sent on application.



OUR readers will notice that this issue introduces a new year for the U. T. Farmer. The past year has been one of marked success, which is largely due to the work done by our retiring editor.

The new staff shall put forth every effort to keep the Farmer at its present standing and, if possible, to add to its interest and value. The retiring editor, in the past few issues has made it a point to have the Domestic Science Department represented by a few articles on such questions of Domestic Science and Art as would interest the housekeepers on the farm.

The educational workers in the South for the past several years have laid great stress upon Scientific Agriculture because they know that the welfare of the nation depends largely upon its agricultural development. But is agriculture any more wide spread or any more important in any nation than house-keeping? The wel-

fare and happiness of the home—and homes make a nation—is dependent upon its keeper.

It is the realization of this fact that has caused Domestic Science to become so intimately associated with agriculture in all educational work, and that has caused us to think it fit, and in fact highly important, that we add a Domestic Science and Art Department to the U. T. Farmer. We hope that the housekeepers will find something of interest and of practical value in every issue, and if they will follow our Domestic Science and Art Department carefully, we are sure they will.

Another addition has been made to the staff, which we hope will make the Farmer more interesting—a General Reporter. Many of our readers are always anxious to know the happenings of "The Hill," miscellaneous news of interest and the general proceedings in the agricultural world. Such news has been given heretofore but with little regularity. By placing this under a special department editor, we hope to keep our readers better informed along these lines.

THE East Tennessee farmers are going to be very busy this month, but in spite of this there will be thousands come to the 40th Annual Farmers' Convention, which meets here May 20-22. And wise they are, too; for no farmer, however rushed his work is at home, can afford to miss such instructive and enthusiastic meetings as the Convention always has. The lessons he learns may free him from that greatest of all Tennessee maladies, "fruitless labor." Much is written about the enormous amount of time and energy that is wasted yearly on account of the "hookworm," which affects the patient so that he is unwilling or unable to work. Why do we not consider the time and energy used by those who are eternally working and yet getting nothing done? Would not this figure up by far the larger total; and is not the one just as much wasted as the other?

If a farmer were unable to work, he would immediately seek for some cure; why then should he not be just as anxious for a remedy when he works always but but can get nothing done?

The better farmers need no urging to come to the convention, so we make this appeal especially to the class that feel that they cannot spare the time, those who are too busy to think. If you have these symptoms, come to the Farmers' Convention May 20-22, and we are sure you will return home in much better agricultural health. A detailed program will be found in this issue.

A NOTHER enormously large record ord has just been completed by a Tennessee Experiment Station cow. Major's Fancy Tormentress 213,294 in a 12-month period, ending April 19, produced 10,484.3 lbs. milk testing 5.98 per cent fat. This gives a butter record of 737.86 lbs. or slightly over 2 lbs. per day for the entire year.

The milk was sold at \$2.25 per hundred, giving a gross income of \$235.90 or a clear profit of \$126.45. Had the milk been retailed at 8c per qt., the income, after accounting for the feed consumed would have been \$865.83 for the year.

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Three cows bred to Agatha's Eminent Landseer 105116; also bull and heifer calves.

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and raised this cow. If they can, the farmers of Tennessee can, for the station has no secret for producing these phenominal producers. It is merely the outcome of selection on the milk-record-sheet basis, and of good feeding. Let's try to get some 10,000 lb. cows in every county.

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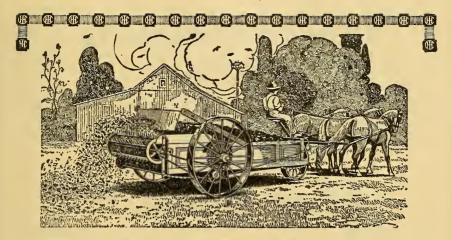


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FIGHT years ago the farmers in a central state averaged crops that ran three bushels less to the acre

than they now get.

Suppose each acre of farm land in the country were so tended that it produced an increase equal to that of this state. How much more money would you have with which to buy the luxuries of life that you earn and deserve? Your share in this prosperity depends entirely upon yourself. The first step for you to take is to fertilize your land properly with manure spread by an

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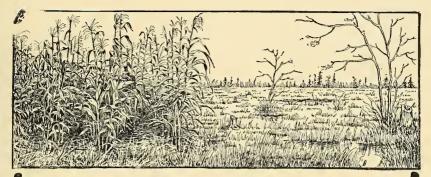
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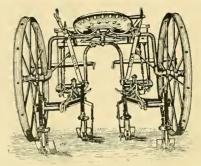
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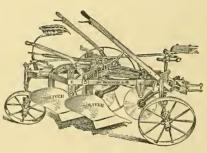
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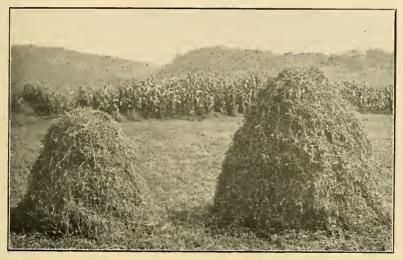
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TENNESSEE

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The Old Farm

Dear sacred Mecca of my heart, Entwined with fondest memory, How often in life's weary maze My winged thoughts return to thee!

Again, as in the vanished years,
I trace the old familiar road,
Where fragrant honey-suckle flames
And Spring takes up her bright
abode.

Once more the dim-roofed, creaking
bridge
Our dancing feet skim lightly o'er,
And loon wonder slove shives out

And, lo, on yonder slope shines out
The old, white farm-house, as of
yore,

Half-hidden in a crimson mist
Of early summer's blushing rose,
Or by the fragrant lilacs tall
Beneath which, bleeding - hearts
unclose.

Far down the little winding path,

Beneath the weeping-willow green,

Embowered in shadows deep and

cool,

The rustic spring-house still is seen.

The air is sweet with locust blooms
That drifting weave the grass
with snow,

And over shining fields of grain
The fragrant summer breezes blow.

Long may thy quiet beauties gleam Within the chambers of my heart, Nor memory's golden harvests fail, Nor songs of many birds depart!

HERBERT GEORGE, '14

THE U. T. FARMER

Vol. 7. JUNE, 1913. No. 9.

RELATION OF LIVE STOCK TO THE FARM

By E. F. ARNOLD

The most important and far reaching question confronting the Tennessee farmer of today is soil improvement. This is especially true of the farmer who has been raising grain for the market. He has in many instances abandoned portions of his soil as worn out, or has rented because of the run down condition of his soil. We wish to call the attention of all farmers, whether their farms are rich or poor, worn out or new, to the following facts with regard to the Relation of Stock Production to an economical rebuilding and maintaining of the fertility of the soil, namely: (1) It increases the soil fertility; (2) it makes possible an economic crop rotation; (3) a home market is created.

By an increase in soil fertility we do not mean merely the 85 per cent of plant food that is returned to the field by feeding the crop to live stock and returning the manure to the field; but rather the effect barnyard manure has upon the texture and structure of the soil along with the development of certain bacteria. We plow our soils to modify structure, or in other words, to arrange the particles so as to attain the greatest amount of moisture and air possible in the soil for plant use. This, however, does not affect the size of particles which must be modified in very fine or coarse soils before we can hope for results from plant foods placed in the soils by

commercial fertilizers. Our soils may be rich in plant food and yet be of such texture as to make it practically useless. By an application of lime the crop yield has been known to increase two fold. How is this accomplished? The lime causes the soil particles to floculate, or in other words it so changes the texture of the particles that the plant food in the soil is made available. The humus in manure, to a very marked degree, has the same effect as lime on soils of very fine texture; hence, the value of manure becomes twofold in that it contains a very high per cent of all plant food and at the same time creates suitable conditions for plant growth.

By favorable conditions for plant growth is meant: (1) A proper moisture content; (2) a temperature suitable for germination and growth. The soil must be of such structure and texture as to permit a passage of oxygen into the soil. We find that these conditions are peculiarly adapted to the growth of friendly bacteria certain change nitrogen into nitrites and nitrites into nitrates which is the available form of nitrogen for plants. The humus in barnvard manure is a food for these bacteria and while feeding on this they give off an acid that sets free phosphorus and potassium, two indispensible plant foods. All of these results may be attained by other methods of treatment but there

is no one element, that when added to the soil, has the same effects as barnyard manure. By keeping stock enough to consume all the products of the farm and by earing for and returning the manure to the field at the proper time he will not only be enabled but forced by the scemingly unkind hand of Mother Necessity to establish an economical crop rotation.

The majority of the farmers of the state today, to our shame, will not plant such legumes as peas, beans, clovers, and alfalfa. These are our most valuable crops not only from a feeding point of view but as soil builders and maintainers as well. Legumes are the only plants known that make use of the nitrogen of the air. They supply our soils this much controlling needed element, the in plant growth. Nitrogen, when not used by the plant, leaches from the soil, hence, we are in constant need of new supplies. The legume offers this for a place in our rotation of crops. By the use of legumes in our crop rotation we find that each succeeding crop is better by having been preceded by the other. Is this not an ideal relation to have on the farm? More especially, since it is brought about by a by-product. Stock raising has been proven to be a profitable business aside from its relation to the farm. There are other phases to this queston of crop rotation and stock feeding that should interest farmers, to wit: (1) The utilization of roughage is made possible; (2) it reduces cost of hauling crop 85 per cent; (3) labor is distributed throughout the year; (4) cost of feed is reduced; not in the sense that you may buy it cheaper on the market, but on the theory that it cost as much to produce 25 bu, of corn on an

acre as it does to produce 50 bu. If it cost 70 cents to produce one bushel of corn when the yield is 25 bu, what will it cost when the yield is 50 bu. on the same acre? The thing simmers down to this: the beef cow on the farm is continually reducing the cost of the feed that is producing the beef. Social as well as soil conditions are making it more and more imperative that the farmer complete the farm sycle which will enable him to produce more on less acreage and at the same time turn out finished products from the farm. By doing this the farmer creates a home market.

When we speak of a home market we mean the consumption of the farm products on the farm. In this way the farm becomes a factory from which only finished products offered the consumer. By turning out only finished products we save 85 per cent of the \$1,000,000,000 spent yearly for freight and transportation of crops. The should be impressed with the fact that everything that leaves the farm should be in the smallest package possible. By way of illustration: We raise grain and feed our poultry and that produces the egg, a finished product; or six pounds of grain will produce a pound of pork ready for the consumer; or again ten lbs. of grain will when fed to a cow produce one lb. of butter ready for parcel-post delivery. You can readily see that by turning out finished products we cut out the middle man's profits. return to the dairy proposition, the ten lbs. of grain will cost about twelve cents, the butter will sell for thirty cents per pound and in addition you have from two to three gals. of skimmed milk which is excellent feed for pigs. By turning out finished products the farmer brings the market more and more under his control where it justly should be.

We have but slightly touched upon the relation of live stock to the farm but space will not permit us to go into detail further than to call the attention of the reader to the way in which it affects soil fertility, to point out the ways in which it stimplates erop rotation and how it makes possible a wider range of crop production and to show the relation live stock bears to a home market for farm products. There is no state better suited for stock production

than Tennessee. We have a very mild climate throughout the year, in fact the experiment station advocates feeding beef cattle in the open all winter. There is not a month in the year that we may not have some crop growing; this means that we may have a pasture the year round. These favorable conditions for live stock production, and the fact that the western beef supplies are diminishing each year make it the height of folly on the part of farmers not to endeavor to keep pace with the new awakening now abroad in the agricultural field.

THE RURAL SCHOOL LUNCH

By MAYME PARROT, Special

Not only food, but the proper kind of food, is necessary for the growing child. Cold lunches made up of heavy and poorly prepared foods are not what the child needs to eat at his lunch hour, when it would be such a simple matter to serve a hot dish or two at this hour. This would mean only a small amount of time, work, and expense.

This simple preparation and serving of a hot dish to school children has been tried and found very successful. Each child was charged two cents for the dish that was served, or, if they preferred, materials could be brought from home to be cooked.

This one lunch hour brought the children together as nothing else could do. There was no rough play no gulping of that cold and sometimes poorly prepared meal. Instead, the children received a portion of nutritious food and had a quiet play hour, supervised by a competent teacher, and were ready and rested,

both in mind and body, to take up the afternoon work with a new zeal, and interest.

This lunch did not interfere with the school lessons. Four girls who had kept up their lessons were chosen each week to look after the cooking. During the lunch hour it was a simple matter to lay the table and serve the food. This may also serve as a means of instruction. The teacher will have an opportunity to give instruction in regard to the different kinds of foods, the proportion necessary to make a well balanced meal, and some of the principles of simple cooking.

Only a simple equipment is absolutely necessary. This may be furnished either by the school board or may be donated by the parents.

The following list of materials will answer very well:

- 1. A kerosene stove with oven.
- 2. One-half dozen of cup towels.
- 3. Two dish cloths.

- 4. Mixing pan.
- 5. Dish pan.
- 6. Spider.
- 7. Frying pan.
- 8. Large kettle.
- 9. Big spoon.
- 10. Boxes for pepper, salt, flour and other supplies which should be kept on hand.

A cupboard to store the supplies in may be made by the boys. The old saying, "Where there is a will there is a way," applies here in case it is not possible to have these things furnished by the school board.

The heating stove and a box filled with hay or sawdust may be used to keep the dishes hot until they are ready to be served.

In the summer months this lunch is a very simple matter. There are the fresh fruits, berries, the simple sandwiches, salads, vegetables, and, best, the fresh milk which may be kept sweet and cold by putting in a covered vessel and kept in the spring branch.

As the cooler months approach, soups, cocoa, canned fruits and heavier foods may replace the summer menus.

Milk and crackers or bread make a very desirable and nutritious lunch; since there is a variety of crackers and breads, there is little danger of its growing monotonous if used on several successive days. Milk may also be used in as many different ways.

School lunches also help children to like more different kinds of dishes. At home they sometimes form the habit of eating one thing only, and mothers will not try to get them to eat anything else.

A PLEA FOR THE FOREST

By J. U. GILMORE, '15

Many times have we seen as many as six ranges of East Tennessee mountains dotted with "new-ground logheap fires" burning throughout the night. The sight is beautiful in the night, but daylight shows more clearly the great wrong that is being done to the forest. The utter foolishness, if we may call it thus, of such wanton wholesale destruction of one of our best resources in the state of Tennessee, is apparent.

The enormity of the offense of a promiseuous forest destroyer is more plainly recognized by a closer view of his work. His desire for virgin soil makes him destroy acres of valuable young wood. A well-kept forest will produce as much per acre per year in money as the average

farmer gets from his arable soil. In logging particularly, any valuable hardwood trees are either used for lumber as the poorer grades of trees, or else they are demolished by the "ramshackle" method of transporting the logs to the 12 horse-power steam sawmill down by the "branch." A mature tree should be harvested; turned into some wood-product immediately. Where the mistake is made, is in letting unscrupulous contractors, or other persons, cut the timber without the owner taking any precautions whatsoever to protect the young growth from injury. Violators acknowledge they are doing wrong but many prefer not to lead the van in the plans for forest preservation.

That the above conditions exist is

due, in large part, to the fact that we as citizens do not know our duty to ourselves, our posterity, and the country at large.

By scientific cutting, or harvesting, woodlands may be made to yield one-third to one-half more material and a much larger portion of the more valuable kinds of wood. Small woodlands are everywhere in demand for fuel purposes. As the available supply of timber decreases we must consider our forests and waste lands as important and extremely valuable assets.

The private owner should know how to protect his woods from fire and from careless and improper treatment. He must also know how to profitably replant waste areas. The kinds of trees that are best suited to the existing conditions should be planted. A certain season and method of planting must be considered by the prospective re-forester before he attempts to complete his project. Very accurate information and advice on this subject can be obtained from federal authorities.

To us the most pressing need of the average forest owner is instruction, in a diplomatic way, however, for cutting his timber so as to perpetuate and improve the forests themselves. The usual methods, as mentioned before, are too often destructive ones. In a great many instances these wrong methods can be changed into simple, practical ways which will eventually increase the productivity of the re-forested areas and woodlands without in any 'degree impairing their present output of fuel or timber.

The U. S. Government has a great system for the taking care of its 163 National Forests, with its Supervisors and patrolmen who camp on the ranges and guard the lands from fire, lumber thieves and hunters.

The devastating forest fire must be feared extremely on account of the resulting loss of valuable timber, the injury done to the surface soil, and often the sad death of people caught in its twirling flames, although the last occurrence is comparatvely rare.

Lookout stations, telephone lines, and warnings given to hunters, campers and fishermen tend to reduce materially the number of destructive fires occurring in the reserves. The public is always sceptical concerning any new project when first proposed, but the Federal methods of fire control have been successful for so long that it is high time we become convinced of their practical value. Indeed, many private holders of forest tracts are adopting similar methods for forest preservation.

Where railways traverse lands, the right-of-ways are burnt free of rubbish so that sparks flying from engines may not start fires. Railways should be compelled to keep these ways clean, and to pay for any resulting damage if not kept in the required condition. These through the fields and forests form admirable fire lines and aid materially in the control of fires which cannot be combatted by the usual methods of eradication. The cost of burning these fire lines is probably \$1.00

Some good points to be mentioned in connection with proper lumbering are as follows:

- (1) Cut no trees unmarked.
- (2) Stumps should be cut low.
- (3) All cuts should be made with a saw.
 - (4) Cut logs into such lengths as

will utilize all the merchantable timber of the tree to 8 inches in diamter at the top end.

(5) All trees, when felled, should be immediately lopped of limbs and the brush piled for burning where no young growth will be injured.

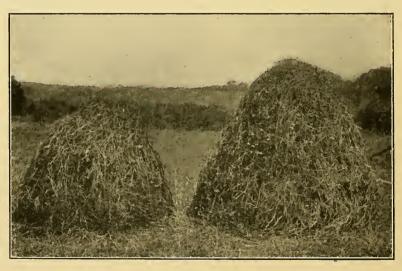
(6) Care must be taken not to injure young trees in felling timber.

EFFECT OF LIMING ON CROPS IN TENNESSEE

By W. T. EVANS, '15

Although largely of limestone origin, very few samples of soils from all over the state show the necessary amount of earbonate of lime which, according to a number of authorities should be about 1 per cent, or about 6250 pounds of pure limestone dust for every foot-acre.

There are several reasons why carbonate of lime is valuable for soils in general. It is used as a plant food and also for nutralizing the soil acids that are injurious to plant growth. It aids the activity of many kinds of useful bacteria. One very important reason is that it plays a part in the



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mechanical condition of the soil in rendering a heavy soil more porous, and making a porous soil more retentive of both water and plant food. In general, sandy soils do not need any more than enough to prevent sourness, while clay soils need more to modify texture. For this reason 0.1 per cent may be enough in some soils while 1 per cent is not too much in others.

It is well known by some that applications of lime have very different effects on the different crops grown. On the one hand, we have crops such as clover and alfalfa that are especially sensitive as to the presence of lime and that fail to thrive until the "acid" or "sour" condition is rendered "sweet." On the other hand, some soils are apparently not affected by applications of lime, while still

others, as cotton, peanuts and watermelons, seem to be actually injured by heavy applications of lime. This important subject of the effect of applications on individual crops has received the attention of many ininvestigators. From the results of experiments in Tennessee, the following table has been drawn up:

Crops which were a practi- cal failure without liming	Crops decidedly helped	Crops moderately helped	Crops little affected	Crops injured
Alfalfa Alsike Clover Red Clover White Clover	Soy Beans	Timothy Ken. Blue Grass Tall Oat Grass Tall Med. Fescue Italian Rye Grass Corn Sorghum Barley Wheat Oats Millet Orchard Grass Eng. Rye Grass Bromus Inermis Bermuda Rhodes Grass Soudan Grass Tomatoes Peppers Japan Clover		Cotton Peanuts Watermelons

With crops which seem to be a little doubtful as to the effect of lime, as tobacco, and with those injured, as cotton, great care should be taken in regard to the time and amount of applications. There may be some soils which are so poor in lime as to really need lime before even these crops can be produced to advantage. In a case of this kind, of course, lime should be added but unless one is sure that his soil is in this condition no lime should be added immediately before these crops are planted.

The results obtained by Dr. Wheeler, former Director of the Rhode Island Station, are as follows:

Crops not benefited by liming	Notes on effects
Adjuke Beans Cowpeas Lima Beans White Beans Blackberries Strawberries Concord Grapes	Injured. Injured. Disadvantageous. Injured. Thrive on very acid soil. With slight acidity, lime would be expected to be of "little or no worth." "Indifferent to lime," but Delawares "in-
Red Top Rhode Island Bent Sheep Fescue Sweet Vernal Millet Watermelons	jured" in a marked degree by sour soil. No benefit. No benefit. No benefit. Injured. Injured.

It can be seen that the results of experiments on Tennessee soils are generally in accordance with Wheel-That some differences should occur is natural because of a great difference, in some respects, of the types of soils. It must also be remembered that lime not only modifies acidity but also increases the available nitrogen in the soil. This last reason is probably the reason that there is a difference in the results of the Tennessee Experiment stations and those of Dr. Wheeler with respect to the effect of lime on cowpeas. The lime made more nitrogen available and this soil supply of nitrogen was used in growth even though cowpeas are leguminous. In respect to the growth of peanuts, many experiments show that there is much more growth above ground, but it proves detrimental to the production of nuts.

Lime is applied mainly in two forms, namely: Burnt lime ground limestone. One ton of burnt lime has about the same lime content as 2 tons of ground limestone. Many experiments have been tried to prove which is the best form to use. On light soils, poor in nitrogen and humus—especially with fine loams—the use of ground limestone has been found best. On the other hand, if the soil is especially heavy, burnt lime is perhaps best to use. Under normal conditions ground limestone should be preferred. Under ordinary conditions two tons of ground limestone should be used per aere, or its equivalent, one ton of burnt limestone. Experiments earried on with these amounts on adjoining plots at West Tennessee Exp. Station show that the increase is a small

percentage more for the use of ground limestone than it is for the use of burnt limestone. The exact amount needed of either ground limestone or burnt lime cannot be definitely stated because of the variability of lime requirements for different soils. There are other forms in which lime is applied, as hydrated lime, airslaked lime, dolomite, wood ashes and marl. In applications, 11/3 tons of hydrated lime is required to equal 1 ton of fresh burnt lime, and 11/2 tons of air-slaked lime is required as the equal of 1 ton of burnt lime. In finding the lime requirement of soil, litmus paper is used a great deal because of its extreme sensitiveness to acids and alkalies.

The need of the use of lime in sufficient amounts with crops in general can hardly be over-estimated. As we have seen, many erops are a failure without liming, and all soils need lime because of the effect on conditions of the soil both as to the mechanical conditions and with regard to bacterial life in the soil and as a plant food. Too much emphasis eannot be placed on the soil requirement of lime, the lack of which has been the eause of failure of farmers and erops in recent years. The marked effects of lime on adjoining plots of land at the University of Tennessee Experiment Station are shown in the photograph on the cover of this issue as regards alsike clover and in the photograph with this article as regards red elover. The latter represents the results of lime 7 years after application.

THE CHANGING POSITION OF WOMAN.

By ROBERTA H. COWLES, '13

The change which has taken place during the past century in the activities and position of woman in the home has created an interest which is wide spread. The honor of this industrial, educational and change does not belong to the woman, it has been a gradual evolution due to economic conditions. Miss Talbot. in her book "The Education of Women," shows this change, contrasting the diaries of two little girls. I shall quote first from a little girl aged ten who belonged to a familv of gentle folk.

Boston, Feb. 22nd, 1771.

"I have spun 30 knots of linningyarn and (partly) new footed a pair of stockings for Lucinda, read a part of Pilgrim's Progress, copied part of my text journal, played some, tucked a great deal, laughed enough."

March 9th, she writes:

"I think this day may be called a piece meal, for in the first place I sewed on the bosom of Uncle's shirt, mended two pairs of gloves, mended for the wash two handkerchiefs, read part of twenty-first chapter of Exodus."

This little girl was not only industrious, but she was accomplished. She learned dancing and attended a writting school; to sum up she was considered excellently educated and ready to take her place in the family which constituted the social organism of the day.

Reading the diary of a little girl nearly one hundred and twenty years later we would find a record like this: She missed breakfast hurrying to catch the car for school. The boys

and girls in her grade gave a scene showing the seige of Troy to the whole school. The children wrote it and made their costumes. It was "Mother's Day" in cooking class and they all came to luncheon after the play except her mother, who had to read a paper at the woman's elub. She helped prepare the grapes for the salad. After school a kodak club was organized and she was made treasurer. The cook left and her father took the family to his club for dinner.

Many sketches of older women might be given, but these illustrate the changes in the occupations of women during the past century. Changes along the line of industrial pursuits, education, civil responsities, domestic duties, philanthropy and social life.

The most striking change which has taken place is due to the industrial revolution on the introducing of the factory system. The removal of spinning, weaving, shoe making, tailoring, candle dipping, from the home to the factory has been complete, and now baking, sewing, the preserving of foods and laundering are fast disappearing from the home. With only a few unimportant exceptions the home has ceased to be the center of production, and the woman has gone out of the home into the factory or other wage-earning occupations. Statisties of 1900 show over five millions of women gainfully ployed out of a population twenty-eight million women ten years of age. This has given to woman in the home the function of directing the consumption of the product of other people's labor. This is a responsibility requiring training far different from that demanded by the woman who distributed the products of her own hands to members of her own family. Such training would include more than the reading advertisements of bargain sales and the ability to keep up with the prevailing mode. It would require a knowledge of fabrics and other materials, methods of production, laws governing different industrial processes, standards of fitness in the article and efficiency in the workman. It should also include an appreciation of human needs that will help to bring about better conditions for the laborer, prohibit child labor, demand a living wage, reasonable hours and beauty, desirability, and simplicity in the product.

The changes in the industrial and educational life has so affected domestic life as to imperil it seriously. The removal of the father and in many cases the mother also to the factory has taken from the children the companionship of their parents. The ease of transportation has taken from the home its permanency. The crowding of families into flats, apartments and tenements has taken away privacy, freedom, and the sense of ownership, all of which are essential to the production of the best family life. With fathers absent from home and communal control with the of sanitary and civic matters have gone many opportunities for training children to assume responsibilities which are conducive to the making of good citizens. The mother is still thought of as the unifying influence, but the factions that she is to unify have been greatly lessened. Education, the making of clothing, the preparation of food, supplying of reading and amusements, has in a large measure passed into other hands. The time, energy, and intelligence thus set free must be utilized in other fields. The mother must no longer be interested in her child alone, she must realize that every child has a right to a healthy and happy life.

The central thought throughout suggestions, regardless of these changes, is that the home is "woman's sphere," and always will be for the majority of women. However, we must get away from the idea that merely being a woman is adequate qualification for her task. The idea around which all her training centers should be her high function as a wife, as a mother, as a home maker. This function will not be found to interfere with the development of her individuality. Happiness, satisfaction, and progress all demand a new view of the home as a permanent institution if the highest welfare of family, individual and nation is to be secured. Under the changed conditions men and women should find expression from those sacred relationships of home which will outlast any industrial, educational, or social system.

STEER FEEDING EXPERIMENTS AT THE TENN. EXP. STA. By L. R. STANDIFER. '15

The Director of the Tennessee Experiment Station has, for the last five years, been experimenting in live stock feeding for the purpose of encouraging more liberal feeding of live stock throughout the state.

These experiments have been made on acre plots set apart for that purpose, and upon which have been grown the crops which were fed the eattle. The different years of the experiment are almost identical, so I shall give here only the results of the last year's work.

In this experiment 28 head of cattle were used, which were separated into seven groups of nearly equal weight, and as many acre plots. The crops (the double crop system is used on these plots) of each acre plot were fed in connection with corn silage so as to just last sixty days.

Each lot was fed separately in a closed pen twice daily. All waste was carefully weighed daily. In suitable weather they were turned out in a near-by lot, which was large enough to give them the necessary exercise for their better growth. They were allowed free access to fresh water. They were given salt every other day, and weighed every ten days. But I shall give here only the initial weights, the weight at end of feeding period and net gain. These are in tabulated form for the sixty days of feeding beginning Nov. 19, 1912, and ending Jan. 29, 1913, as follows:

,	No. of Group	Initial Weight	Weight at End of Period	Net Gain
Soy Bean acre	1	4235	4772	537
Cowpea acre	2	4242	4774	532
Corn acre	3	4229	4520	291
Soy Bean Hay acre	4	4239	4631	392
Wheat acre	5	4248	4684	436
Oat acre	6	4241	4708	467
Alfalfa acre	7	4245	4610	365
Total		29,680	32,699	3,020

From the above figures we find that group 1 which was fed on the Soy bean acre did best, making a net gain of 537 pounds, with group 2 a close second made a net gain of 532 pounds in the sixty days fed. While group 3, which was fed on the corn acre made a gain of only 291 pounds in the sixty days.

In conclusion I would say that these cattle could have been purchased the first of November at from 5c to 6c per pound. When the experiment ended in January they could have been sold at from 7c to

8e per pound. Thus the feeder gets a 2c margin on every pound of live weight that he buys plus 7c to 8c per pound for every pound of flesh that he puts on. Besides this gain, which will more than pay for all the feed at market prices, and all other necessary expenses, it furnishes a home market for the crops, occupation for through the farmer the winter months, and above all the fertility of the soil is kept on the farm. Therefore, I see no reason why the farmers of Tennessee do not raise and feed more live stock.

THE SELECTION AND CARE OF THE HERD BULL

By FRANK R. HINES, '14

There is an old opinion among breeders that the bull is half the herd, but no doubt this article will convince you that he is much more. Many breeders make use of a scrub or grade sire to prevent paying out money for something that would, if they only knew it, be of great value to them.

He should be a pure bred of the type which the breeder intends to use, or if used on a grade herd, one that is best suited to the purpose in view. It is reasonable to suppose that a bull whose ancestors have been bred for high production is more certain to transmit the characteristics to his offspring than one whose breeding is not known. Almost any pure bred bull of the dairy breeds can be used on a grade herd of poor milking qualities with good results, but on a herd which has been bred up for several generations, much more care must be exercised in the selection. The breeders of high class animals recognize this fact, and also know that every bull has not the same power to transmit these qualities, so they are anxious to purchase one whose offspring show the transmission of these characters.

The importance of selection by testing may be shown by the following figures from the Missouri Experiment Station:

In every case the daughters were inferior to the dams.

Bull No. 2. Average of 11 daughters—

dams	d'trs
Av. milk yield4969	4576
Av. fat, per cent4.66	5.49
Av. fat yield 231	245

Decrease of 393 pounds of milk with a gain of 14 pounds of butter per year. Six of the daughters fell much below their dams.

The daughters show an increase of 1410 pounds of milk and 66 pounds fat per year.

 Bull No. 4. Average of 3 daughters—
 dams d'trs

 Av. milk yield
 4775 8005

 Av. fat, per eent.
 4.97 4.80

 Av. fat yield
 238 384

The daughters averaged 3230 pounds of milk, and 146 pounds more butter per year than their dams. The least increase in any one of the daughters was 1481 pounds of milk. Bull No. 4 was raised in the Missouri College farm and his value was not known until after he was sold, and no record was kept as to where he went.

The daughters just about held their own, giving only 55 pounds of milk and 3 pounds fat.

Now if we compare the offspring from bull No. 1 with those of bull No. 3 we will see that those from No. 1 averaged 1009 pounds milk and 18 pounds of butter less than their dams per year. This in a herd of 20

eows would mean a loss of over 20,000 pounds of milk and over 360 of butter fat per year. With the offspring from No. 3 we have an average of 1410 pounds of milk and 66 pounds of fat more per year than their dams. If 20 daughters of this bull were used we would have an increase of nearly 17,000 pounds of milk. At \$1.50 per hundred weight this would mean an increase for the herd of \$255 per year over their dams, while the herd from No. 1 would mean a loss of about \$300.

As shown above there are two methods of selecting a bull: The first is to select a young one on the records of his ancestors, which may be a very good plan for a breeder of grade or low producing capacity, but eare should be taken to see whether the record is based upon the butter fat or the butter basis, and preferably should be officially tested.

The second method, which is the only one to be definitely relied upon, is to buy a tested bull, one that shows the power to transmit the dairy characteristics. For this reason young bulls should not be sold until their offspring reveal the presence or absence of these characters. Many old bulls are for sale because of the fear of inbreeding, and here is the place to buy, provided records have been kept so that one can safely judge the value of the bull as a breeder.

The bull ealf to be used at the head of the herd should be well fed from birth to maturity so that he will develop into a full sized animal, and be ready for service at an early age. His offspring can be more quickly tested, and it also prevents the extra time of caring for him till he is ready for service. He

should be raised on skim milk as far as possible, for it is cheaper and gives as good, if not better, results than raising on whole milk. Of course a liberal ration of grain should be fed from the time the calf is old enough to eat. A ration of 3 parts corn, 2 parts barley, with 1 part of soybeans is a very good one for a calf 3 to 6 months old, and then the ration can be widened by adding 1 part of corn or barley to the above ration, with skim milk.

The young bull should be taken away from the heifers at six months of age. He may be bred to five or six cows by the time he is one year old, then up to fifteen months may be used on one or two cows per week. From fifteen on the services may be gradually increased.

At one year of age a ring should be put in his nose. This makes him more easily handled, and may serve as a protection in ease he attacks some one.

The bull should never be allowed to run loose in the pasture with the herd for it is a dangerous custom and no definite record can be kept of when the eows are served. Also, the cows are often served too early after calving, and it is hard to regulate the freshening of the cows. If allowed to run with the herd he may so injure himself that he becomes practically worthless as a breeder, although he might otherwise be a very valuable animal. The main point is to avoid injury and to retain his breeding qualities until his value as a breeder is determined.

Preferably, he should be kept in a good roomy box stall with a strong lot outside in which he can be kept in all except severe weather. If he has a good roof over him and walls

on two sides to protect him from the wind, he is all the better off, and with such treatment he will be as good at nine or ten years of age as at any other time. If more than one bull are to be kept they may have the same lot provided they are dehorned. If kept together they will take more exercise, which is very essential to their health.

Bulls of dairy breeds are usually more vicious than those of other breeds and should always be handled with eaution, for it is usually the gentlest one that does the most hurt. He should always be treated kindly, but never petted, and by all means never allow him to be teased. It is better to let him strictly alone except when he must be handled, and then he should always know that the man has entire control. If he is trained to lead when a calf he will always remember it and can be much more easily handled. If possible the lot in which he is kept should be where he can see the other cattle, for isolation is injurious.

Always use a staff when leading him and be sure it is good and strong.

SWEET POTATOES

By JESSE M. SHAVER, '15

The sweet potato has come to be one of our most important vegetables, especially in the South, where enormous quantities are grown, both for home consumption and for the Northern markets. The sweet potato, being distinctively a warm weather plant, thrives in our Southern states and in fact all tropical countries; in some of which it has practieally supplanted the Irish potato. Besides its use as a table vegetable, it has been used very successfully as a food for stock and hogs, while the vines have been used for hay. These varied uses classify it at once as a valuable vegetable both for the trucker and the general farmer to raise.

This esculent does not exhaust the soil like cereals; it being estimated that a yield of 200 bushels per acre (which by the way is only a moderate erop) will take from the soil for tubers alone only thirty pounds of nitrogen, ten of phosphorie acid, and forty-five of potash.

The sweet potato requires a liberal rainfall, although too much at the time of the maturing of the tubers is detrimental because it induces a vigorous growth of vine at the expense of the tuber. They do best in a warm sandy soil and require a growing season of three and a half months. The variety to grow depends somewhat on the market, some markets require the mealy varieties, while others prefer the syrupy kind; and if the vegetable is raised for stock feeding the larger, better vielding varieties should be selected. The best known "mealy" varieties here are Southern Queen, the Jersey group, the Pumpkin Yam, Vineless, and the Spanish Yam; while the Georgia and Sugar are probably the best syrupy varieties. Comparative tests earried on by the Georgia Station show that White St. Domingo, a large, coarse potato, yields more than three times as many bushels as the Southern Queen; in one experiment it was found that the St. Do-

mingo yielded 600 bushels while the keep them alive until they can send Southern Queen yielded 160 bushels, making it more profitable for stock feeding. Where yams are in demand, the Tennessee Yam is regarded as the best for the trucker; it is very prolific, and produces a smooth medium sized potato. Vineless is coming more and more into favor each year, and may be planted closer together than other varieties.

Sweet potatoes are propagated from slips which are secured from the bedded sweet potatoes. A bed is generally six feet broad and as long as desired; planked up somewhat like a cold frame. The bed is dug out to a depth of ten to ewelve inches; a layer of leaves or straw put in; four or five inches of manure put on this, and a layer of soil covering this. small, well-formed tubers are selected (it is best to select these from the most prolific hills) and laid on the bed side by side, but not touching. The bed is now covered with about two inches of garden soil and is protected by mats on extra cold nights. When the slips are five inches high they are ready to be transplanted to the field. The land should be well prepared; land which was well cultivated the previous year is the best. slips are transplanted ridges about three and a half to four feet apart at a distance from each other of eighteen inches, when the ground is somewhat damp. This distance has been found by experiments to give the highest yield of merchantable tubers. Although the ridging increases the cost of cultivation it increases the yield materially, probably by forming a loose place for the tubers to enlarge in. If it should be necessary to transplant during a dry spell, the roots should be dipped into a mud batter before setting; this will

out roots to take care of themselves. Thorough cultivation is essential to secure the largest yield. Since the sweet potato is a warm weather plant, slips should not be set into the field until May. The potatoes should be dug before frost. The vines are removed and cured for hay, or are turned under as a green manure crop. As a feed they have about the same value as cow pea hay. food elements of the vines are as follows:

Protein, 12.48 per cent. Carbohydrates, 78.79 per cent.

After digging, the tubers should be allowed to dry before being gath-They are gathered in bushel baskets or other convenient carriers and stored. Sometimes they placed in cellars, sometimes in special constructed houses, and sometimes hilled in the field like Irish po-They should be ventilated tatoes. and kept below 60 degrees while the sweating is going on. In storing potatoes it is very important careful:

I. Not to store immature, cut or bruised potatoes.

II. Dry before storing and keep from rats and vermin.

III. Dig before frost injures vines.

Chemical fertilizers seem better suited to this crop than manure. The University of Georgia, after making many experiments, has come to the conclusion that a fertilizer composed of the following is the most satisfactory:

364 lbs. Superphosphate testing 14 per cent phosphoric acid.

338 lbs. of Cotton Seed meal testing 7 per cent nitrogen.

650 lbs. Kainit testing 12½ per cent potash.

This fertilizer will cost about \$11.42 per acre, and where it was used it increased the yield from 1/4 to 1/3 the yield of the unfertilized acre. Cotton seed meal is preferred

to nitrate of soda and kainit to muriate of potash.

As a stock food it will be well to compare the sweet potato with other tubers or roots.

Name of Vegetable	Per cent of Protein or Mus- cle Builder	Per cent of Car- bohydrates or Fat Formers
Sweet Potato	1.5% $1.6%$ $1.1%$ $1.2%$	$\begin{array}{c} 26.4\% \\ 11.4\% \\ 9.3\% \\ 9.0\% \end{array}$

From the preceding table it is plain that the sweet potato conmuch muscletains almost as building food as anv of the common roots and more than twice as much fat forming material as any of the others. This suggests its value as a food for cattle and hogs. The experience of Mr. Robinson, of Alabama, might be interesting here. Mr. Robinson made a test of three pens of six hogs each on different rations for 28 days with the following results:

I. Pen fed shorts gained 33 lbs.

II. Pen fed corn gained 53½ lbs.
III. Pen fed potatoes gained 24½ lbs.

From this data it appears that sweet potatoes are worth less than half as much as corn for fattening hogs; but it might here be suggested that a judicious mixture would be both profitable and economical. The real question as to whether he can afford to use potatoes as stock food must be settled by each farmer. The market price of the tubers, nearness to market, marketing facilities and storage capacity must all be taken into consideration.

USE OF SILAGE IN BEEF PRODUCTION

By C. W. HART, '15

Silage was introduced into this country about 40 years ago, and soon proved very satisfactory to the dairyman. The excellent results attained from the use of silage for dairy cows have suggested the possibility of its being used in the production of beef. The rapid advance in the price of farm land has had a tendency to awaken the idea in the cattle feeder that he must utilize, to

the best advantage, the roughage grown on the farm.

Numerous experiments were made by the several Experiment Stations in various states to prove the value of silage in the production of beef. Several of these experiments proved good and today many farmers have taken up the practice of growing and fattening beef with silage and the results have proven satisfactory. Where silage is not used in beef production, stover, which is even more costly than silage, must take its place. To store away stover from 15 acres of corn it requires a large barn which would probably cost three times as much as a silo that would hold the same amount of stover in the form of silage. A silo constructed 15 feet in diameter and 30 feet high will hold 15 acres of corn producing 15 to 16 tons per acre and will cost about \$250.00.

In early spring many farmers look forward with pleasure to the time when their cattle can be turned into pasture, but they do not realize that this is a very expensive method of feeding cattle. Henry's "Feeds and Feeding" tells us that it takes from $2\frac{1}{2}$ to 3 acres of best blue grass land to furnish pasture for one 800-1000 lb. steer for a period of six months, and that one acre of the same land will produce from 15 to 16 tons of silage which will feed the same steer for a period of 400 days.

We find in Tennessee and many other Southern states that there are bottom lands along the rivers and other low lands that are especially adapted to growing silage crops. where pasturing is not profitable. Our pasture lands are greatly affected by droughts; so much so at times that it becomes necessary to feed cattle in order that they may make proper gains. In a season of this kind silage may be used to advantage. On the other hand we have crops for producing silage which are almost drought resistant, which will produce a great deal more feed than will the pasture.

Silage is a complement to cottonseed meal. While it is not absolutely necessary to feed cattle on the farm to maintain the fertility of the soil, it is an important factor. The byproducts of cotton-seed meal are very abundant in the South and only a small portion of this is being used for feeding cattle. Corn silage contains a large percent of water and if fed alone may at times become dangerous to the animal; on the other hand, if large quantities of cottonseed meal are fed there is a tendency to burn out the stomach of the animal. Experiments have been made at the Purdue and Tennessee stations, where cattle were fed on silage and cotton-seed meal making a gain of 2.15-2.40 lbs, per day. Thus a good corn silage makes possible the use of cotton-seed meal to advantage and at the same time keeps up the soil fertility.

There are various crops that are used in the making of silage. Corn silage is generally placed first for the feeding of beef cattle therefore used more than any other crop. There are different varieties of corn used in the South for making silage; those that require a long growing season and those that mature quickly. Corn intended for the silo should be planted much closer than that used for grain. The stalk will be smaller and will contain more digestible matter when grown closely. It should be harvested about the time the corn is in the dent.

The cost of producing corn silage varies with the amount of cultivation and amounts of fertilizer used, the average cost being about \$2.00 per ton. The stover from corn used for grain, if cut at the proper time, may be profitably used with other crops as "Legumes" for making silage. Next in importance is sor-

ghum. The cost of production is about the same as corn and the returns will be about double. Sorghum has an excellent drought-resisting quality which gives it quite an advantage over corn as a silage crop for the South. It is not used very extensively yet but farmers are beginning to see its good qualities and are sure to give it a more important place in the future. should be harvested when it has a well filled seed-head. Third in importance are the leguminous crops. These are fast coming into use for silage purposes. While clover is seldom used for silage it is found to be a valuable feed as hay with corn silage. The Purdue University station (Bulletin No. 153) made several experiments on feeding of roughage for fattening cattle. The cattle were fed the same grains and different roughage, the results of the experiment show that those fed on corn silage and clover hav combined made from 1/4-1/2 lbs. better gains per day, than those fed on any other roughage used. Soy beans make a good silage when mixed with equal parts of corn and sorghum. Cow peas have about the same value for silage crop as soy beans, except that silage from the soy beans is richer on account of the large amount of grain the latter contain. As peas require no cultivation they may be grown with other crops such as corn and sorghum.

The South Dakota Experiment Station has proven, by a number of experiments, the value of corn silage in the production of beef. In one experiment 5 lots of 4 steers each were fed on different rations with the following results:

Lot No.	Ration	Amount of Grain Per Steer	Average Daily Gains
1	Corn silage alone	216	2.40 lbs.
2		112	1.25 "
3		117	1.94 "
4		14	.65 "
5		128	1.76 "

The results show that neither corn fodder nor fodder and silage, nor ½ ration of silage and hay proved as valuable for the steer as first class corn silage alone.

The following concerning the value of corn silage in beef production is taken from Bulletin No. 163 of the Purdue station.

1. They found that the addition of corn silage to a ration for fattening cattle decreased the consumption of shelled corn in amounts closely approximating the grain content of the silage consumed by the cattle.

- 2. The addition of corn silage once daily to a ration of shelled corn, cotton-seed meal and clover hay reduced the cost of grains \$1.83 per hundred pounds and increased the total profits \$8.85 per steer.
- 3. The addition of corn silage twice daily to a ration of shelled corn, cotton-seed meal and clover hay reduced the cost of grain \$3.17 per hundred pounds and increased the profits \$11.19 per steer.
- 4. The substitution of corn silage for clover hay in a ration of shelled corn, cotton-seed meal and clover

hay reduced the cost of grain \$4.35 per hundred pounds and increased the profits \$17.97 per steer.

5. The more nearly the corn silage replaced the clover hay in the ration the cheaper was the grain and the greater the profit.

In the above experiments it required a less number of pounds of dry matter where silage was fed to put on a pound of gain. The cattle raisers and feeders would do well to

consider the use of silage for fattening cattle. When we realize that only 7 per cent of the cattle feeders use silage and this small per cent are having great success by its use, we may conclude that it will be only a matter of time when every feeder who expects to get the high dollar for his cattle will be compelled to use silage for growing and fattening his market beef.

NEWS

Professor H. A. Morgan left a few weeks ago for a three months visit abroad. He is making the trip with several others in co-operation with the Southern Commercial Congress. They will visit the various countries of Europe, including Ireland, studying sociological and agricultural problems, and also the Rural Credit System of those countries.

The dairy car that has been touring East Tennessee has just completed its round and has no doubt raised considerable interest among the dairymen. This car has been through many towns of East Tennessee and has had besides the Southern Railway dairyman, such men as Professors Pridmore, Hardin and Hutton of the University of Tenn. to make talks along dairy lines. We are glad to report its success.

Mr. Pen Worden spent a few days on the "hill" recently.

Mr. W. K. Tipton, Professor of Agriculture at the Hixson High School spent two or three weeks on the "hill," being here during the Farmers' convention. The East Tennessee farmers have just held their 40th Annual Farmers' Convention, making it a bigger thing than ever. The Institute was held at O. P. Temple Hall, University Farm, with a large attendance.

Professor C. A. Keffer, acting Dean of Agriculture, has been visiting the West Tennessee Experiment Station.

The question "What will it be?" of the last issue of this paper has been answered. On the 17th of last month the Ag. Club gave a big Agricultural boosters' banquet at the Imperial hotel. This was the first of its kind here and as it was such a success it will no doubt be made an annual event.

At the last meeting of the Ag. Club the following officers were elected for the beginning of next year:

- C. M. Hume, President.
- G. E. Shelby, Vice-President.
- F. S. Chance, Sec. and Treasurer.
- G. B. Thackston, Critic.
- E. F. Arnold, Sergeant-at-Arms.

With these men at its head the Ag. Club is sure to boom next year.

THE U. T. FARMER

Scientific; therefore practical

Published Monthly by the Agricultural Club of the University of Tennessee,

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Graduates of Agriculture College, University of Tennessee, 1913. Top row, (left to right) John Titsworth, P. P. Hite, H. A. Powers. Lower row (left to right) H. P. Ogden, C. A. Hutton, Jehu Hinshaw, K. A. Neely.

The Agricultural students here have for some time been giving considerable thought to the problems of unity and co-operation. They have come to realize the fact that if they are to give their best service they

must do so in a body. The outcome of this idea has naturally led to the formulating of some plan by which the students themselves should become better organized, more intimately associated with each other and with the faculty, and instilled with the spirit of unity of purpose and action. It was decided that nothing would bring about these desired results so well as an Agricultural Banquet and from the brilliant success of the affair we have concluded that the decision was right.

We do not wish to say that this is the only way to bring about unity and co-operation, nor do we wish to advise farmers to have banquets for this purpose, but we do maintain that any kind of a gathering where a group of people come together for a common purpose, let that purpose be entertainment or business, will bring about a co-operative spirit. Every community of farmers should gather together occasionally, if it were for no other reason than to cultivate the habit of working together.

Undoubtedly, the lack of co-operation and sympathy among farmers has been one of the chief factors in keeping agriculture so far behind the times. Where would science be if every student had to discover everything for himself, or what would the arts and literature be if the great minds had left us to work out our own salvation along these lines? Yet the average farmer must do all for himself if he is to learn anything at all. Each generation must make the mistakes of the generation before since there is a prevailing tendency among farmers to keep their successes and failures to themselves or at least in their family. If meetings were held where mistakes are frankly confessed and explained for the benefit of the community and where failures and successes are discussed, each farmer would have the advantage of the experience of all the rest.

Not until we have such a condition prevailing can we expect to develop rapidly, for experience is a costly teacher and as long as every farmer must learn everything by experience farming cannot be a great success. Let's all work together, help our neighbors, ask them to help us, and make farming easier and more pleasant for the future generations.

Make plans for the future so that when the time comes to act you do not have to worry about what step to take. If you suspect that you are going to have a great deal of fruit and late vegetables at a time when prices are low and when the market is flooded, consider whether or not it would be a good thing to buy a small canner to can your produce. If you once have it in cans you can await your own prices, whereas the fresh material must go today regardless of prices. A small canner is very inexpensive and is easily manipulated. Think over this matter now for when your tomatoes and peaches are rotting on your hands it will be too late.

Here is a good place to carry out the idea stated above, that of cooperation. Combine with a number of your neighbors and buy a canner if it is not practical to buy one for yourself. By combining with your neighbors you can also get your cans in larger lots and thus at a lower price.

800 GALLONS OR 1500 GALLONS

A few years ago the N. Y. Experiment Station started out to prove that "Scalecide" was too expensive, but they found that in orchard work 9 gals, of "Scalecide" which makes 800 gals, of Lime-Sulfur. This being the case, a barrel of "Scalecide" which makes 800 gals, of spray at the strongest strength, will go as far and do better work than 1500 gals, of Lime-Sulfur spray, which will require 3½ barrels of the best Lime-Sulfur. The Missouri Experiment Station reports that "Scalecide" killed 100% of scale in 5 out of 7 tests. Lime-Sulfur did not do it once in 10 tests in the same orchard. "Scalecide" has greater fungicidal properties than Lime-Sulfur as a Winter wash. A postal request to Dept. "A" will bring by return mail, free, our book, "Modern Methods of Harvesting, Grading and Packing Apples," and new booklet, "Scalecide—the Tree Saver." If your dealer cannot upply you with "Scalecide," we will deliver it to any R. R. Station in the U. S. east of the Mississippi and north of the Ohio Rivers on receipt of price: 50-gal. bbls., \$25.00: 30-gal. bbls., \$16.00; 10-gal. cans, \$6.75; 5-gal. cans, \$3.75. Address, B. G. Pratt Company, 50 Church Street, New York City.

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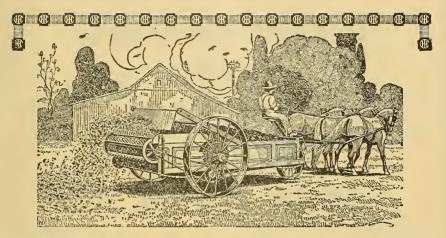
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What Three Bushels More to the Acre Means

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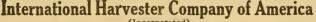
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The Bigness of Little Things

The typhoid fever germ is microscopic in dimensions, but unless treated with the typhoid serum is mighty in the results it is able to accomplish.

With equally humble origin and unpretentious size the bacteria of unclean milk reduce its market value as well as the market value of the butter or cheese into which such milk is manufactured.

To insure against such injury by removing bacteria as well as all other objectionable matter as far as is possible to be done physical and mechanical means is the work of



How well it does this work is not a matter of hearsay, but one upon which abundant proof of an authoritative, as well as a practical nature is

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easily obtainable. Or what is better, ask your dairy supply man to send you a barrel or keg of Wyandotte. Try it for yourself, if not all we say the trial will cost you nothing.



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Every sensible person wants the best of everything, but in many things the best is beyond their means and they must necessarily be content with something less.

In the case of a Cream Separator, however, the best is fortunately the cheapest as well, and it is of the greatest importance that every buyer of a separator should know this.



Moreover, the best is of more importance in the case of the Cream Separator than in anything else. since it means a saving or a waste twice a day every day in the year for many years.

It is true that DE LAVAL Separators cost a little more in first price than some inferior separators, but that counts for nothing against the fact that they save their cost every year over any other separator, while they last an average twenty years as compared with an average two years in the case of other separators.

And if first cost is a serious consideration a DE LAVAL machine may

be bought on such liberal terms that it will actually save and pay for itself.

These are all-important facts which every buyer of a Cream Separator should understand and which every local DE LAVAL agent is glad to explain and demonstrate to the satisfaction of the intending buyer.

If you don't know the nearest DE LAVAL agent simply address the

nearest of our main offices as below.

THE DE LAVAL SEPARATOR CO.

NEW, YORK

CHICAGO

SAN FRANCISCO

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DRAIN TILE, PORTLAND CEMENT, WOOD FIBER AND CEMENT PLASTER, READY ROOFING AND BUILDING PAPERS.

Write or call for literature on "Uses of Concrete on the Farm."

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Knoxville, Tennessee

Study Your Wheat Before You Harvest It

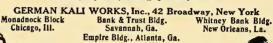
If the yield and quality are bad you must do better. If they are good it will pay you to make them better. A better fertilizer will do it. The usual wheat fertilizers do not contain enough

POTASH

Use 6 to 8 per cent. Potash, instead of 1 to 2, and balance the phosphoric acid of the bone or phosphate.

Tell Your Dealer about this Now before the fertilizer salesman arrives. Write us today for our free book, "Fall Fertilizers."

We sell Potash Salts in any amount from 1 bag (200 lbs.) up. Write for prices, stating quantity needed.





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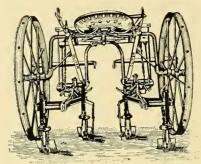
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